

Detailed geologic maps of the Wilderness Study Area are not currently available. Existing published maps include Tweto* and Crawford and Worcester**. Mineral exploration companies have mapped portions of the WSA in detail, but the information is not available for public use. The Uranium-Thorium branch of the U.S. Geologic Survey is currently mapping in the area. The mapping program is incomplete.

- Soils, Fossil Ridge - Soils of this WSA can be divided into two main groups: very cold alpine soils and cold subalpine soils.

The alpine soils occur above timberline and are fairly variable. They are generally shallow, less than 20 inches to bedrock, coarse textured, somewhat acidic and weakly developed. Rock outcrop is a common occurrence with these soils. Soil temperatures are quite cold with mean annual temperature less than 32°F. These soils are sensitive to erosion and are slow to recover from disturbances.

The subalpine soils occur in the forest areas associated with mixed conifer vegetation. These soils are generally deeper to bedrock than the alpine soils. Soil textures are variable, development is weak to moderate and rock outcrop not as prevalent as with the alpine soils. Soil temperatures are cold with mean annual temperatures higher than 32°F, but lower than 47°F. When vegetation is removed, these soils can be susceptible to erosion.

- Social and Economic Setting, Fossil Ridge - Prior to the mid-1800's, area residents were the Ute Indians and the few "mountain men" who ventured into the mountains to hunt and trap. As the first white settlers moved westward from the front slopes of the Rocky Mountains they settled along the main rivers, in the fertile valleys. Irrigated crops were grown and cattle and sheep grazed.

Mining exploration began in the 1860's. Placer deposits yielded little gold, however large silver deposits discovered in the late 1870's renewed the rush of settlers into the area. Crested Butte, later to become a coal mining town, developed as a supply and service center.

Mining activity stimulated rail transportation. By 1880, the Denver and Rio Grande Railroad had established a line to Gunnison. In 1880, Gunnison's population was between 5,000-6,000. It was a prosperous community providing supplies and services to farmers, ranchers, and miners. In 1881 the rail line extended to Crested Butte.

Extensive anthracite coal deposits were discovered in the 1880's. This discovery started another mining boom. The area gained national recognition as a coal center. The coal mining industry prospered until competition from alternative fuel sources forced the last "big mine" to close in 1952.

Source: * Tweto, O., T.A. Steven, W.J. Hail, and R.H. Moench, 1976. Preliminary Geologic Map of the Montrose 1° X 2° Quadrangle, Southwestern Colorado. U.S. Geological Survey, Miscellaneous Field Studies, Map MF-761.

**Crawford, R.D. and P.G. Worcester, 1916. Geology and Ore Deposits of the Gold Brick District, Colorado. Colorado Geologic Survey Bulletin 10.

The mine closing created an economic void that left Crested Butte in a depressed condition. Gunnison had a more diversified economy and was better able to maintain a healthy economy. Crested Butte began to recover with ski area development in 1962.

The WSA is located within the Gunnison Human Resource Unit (HRU) and near the Crested Butte HRU.* Mining could become a significant element in the HRU's. Exploration for the proposed Mount Emmons mining project began in 1974. The company submitted an operating plan in 1979 to mine a large molybdenum deposit in Mount Emmons.** Current market conditions, however, preclude mine development in the near future. In 1982 the company withdrew its operating plan.

--Population, Employment, and Income, Fossil Ridge - Western State College currently employs 250-275 persons. The figure drops significantly in the summer. Local businesses derive a significant proportion of their sales from the college population.

Eighty-five ranches operate in the County. The average ranch supports a 350-cow operation. Most valley ranches are highly dependent on Federal and other government land for summer pasture.*** Estimated total gross output in 1978 was \$13 million.****

The 1970 census indicated that 3% of the employed population, 78 persons, were attributed to the mining industry. This level was relatively static until 1975 when activities at the Homestake Pitch mine and proposed Mt. Emmons Project started.

From 1975 to 1981 the mining industry increased to 148 year-round employees. They are directly attributable to the Homestake and Mt. Emmons projects. Since 1981 these employment figures have fallen off considerably due to market conditions. The numbers exclude construction and service-related activities which are generally provided through contracts.

Over the same time period, 1975 to 1981, major companies experienced an increase in seasonal mineral exploration activities. It is difficult to determine the exact number of such operations. Estimates are between 10 and 15 in Gunnison County in 1979. These activities provided employment for an additional 100 persons during 1979. Much of the County lies in the "Colorado Mineral Belt." Available information indicates extensive mineral resources.

Source: * Proposed Land and Resource Management Plan, USDA, Grand Mesa, Uncompahgre and Gunnison National Forests, October 25, 1982.

** Proposed Mount Emmons Mining Project, Draft EIS.

*** East River Land Management Plan, Final Environmental Impact Statement, USDA, Forest Service.

**** "Of Change and a Valley," Harvard University, Department of Landscape Architecture, 1980.

Much of Gunnison County employment is seasonal. This is common in a tourism-recreation based economy. Other industries in the County are also highly seasonal. The ranching industry has peak labor needs during spring and fall roundups and during hay cutting time. The college also displays seasonal employment. Work force drops sharply in the summer months. Peak employment periods in the County are July-August and December-January, reflecting summer and winter recreational activities.

--Lifestyles, Fossil Ridge - The principal sustaining industries in Gunnison County are tourism, recreation, education, and agriculture. The mining industry was growing rapidly and could have the potential to become the major industry in the County.

The recreation and tourism industries are growing. Ranching, while a long-time sustaining industry in the County, has been declining in economic importance.

Summer and winter recreation opportunities provide the basis for a substantial amount of income and employment in the County. Summer tourism is estimated to account for 765,000 visits to Gunnison County annually. Winter tourism can be primarily attributed to the skiing opportunities at the Crested Butte Ski Area. It provided for 283,000 skiers during the 1979-80 season. Retail and service businesses derive the majority of their receipts from tourist expenditures. Ranching and tourism are dependent on National Forest System land. Summer recreation emphasizes fishing, boating, picnicking, and camping. Four-wheel drives are popular.

A Gunnison County survey shows the county residents are well educated. Sixty eight percent of the residents have some college training, 38% have graduated, and 16% have advanced degrees.

A rural ranching lifestyle is predominate in the area. Ranching tends to exert a very strong local influence. Exceptions exist in the academic community at Gothic and the winter and summer tourism oriented communities at Crested Butte and Mount Crested Butte.

--Attitudes, Beliefs, and Values, Fossil Ridge - Participants to a resident survey were quite satisfied with the "quality of life" in Gunnison County. Eighty five percent said Gunnison was a fine place to raise a family; 95% were satisfied with outdoor recreation opportunities; 93% were satisfied with the friendliness and concern of neighbors; 84% liked the water quality. However, 60% were dissatisfied with the housing and more than 33% were not satisfied with job opportunities, indoor recreation opportunities, and shopping facilities.

Some residents view growth as positive. They feel it will bring employment and education opportunities, shopping facilities, better roads and enhance community growth and stability. Some said that without growth there is stagnation, but that growth should be controlled and planned. Others said they do not want quick growth and they do not want the population to get "too big." Growth would change the small town atmosphere and make housing more expensive and scarce.

Public issues indicate local opposition to minerals development and the effect growth will have on water quality and big game population. Interest and concern in land and resource management is high. The public has a concern over grazing and preservation of the area in its natural state. Public issues were raised opposed to and supporting additional wilderness.

--Social Organization, Fossil Ridge - The Gunnison HRU is a large mostly rural unit. Full service fire, law enforcement, search and rescue, medical, news media, planning and commercial trade services are available in Gunnison. Limited services are available elsewhere in the unit. Elementary and secondary school education is available through high school. Western State College provides opportunity for higher education.

The Crested Butte HRU is a rural unit centered around the ski area. Limited fire, law enforcement, search and rescue, medical, local news media, local planning, and commercial trade services are available. Education is available through high school. Most residents travel outside the unit for major purchases.

--Population and Land Use, Fossil Ridge - Gunnison County is the sixth largest county in the State of Colorado, encompassing 3,238 square miles.

Gunnison County's permanent population increased from 7,500 to 10,700 from 1970 to 1980. This is an increase of 41%. Incorporated towns include Gunnison, population 6,000; Crested Butte, population 1,250; and Mt. Crested Butte, population 150. The remaining 3,300 persons are located in and around the rural villages including Almont, Tincup, Pitkin, and Somerset. Ethnic distribution is approximately 95 percent Anglo, 3 percent Spanish surname, and 2 percent other ethnic origin.

Gunnison County is one of the most sparsely populated counties in Colorado. Density is approximately 3 persons per square mile. In 1970, the population density was approximately 2.4 persons per square mile. The 1980 census shows a 237% growth for the Crested Butte division of Gunnison County for the period 1970 to 1980.

--Recreation, Fossil Ridge - Current recreation activities include fishing, hiking, horseback riding, big game hunting, viewing scenery, cross-country skiing, mountain climbing, snowmobile travel and motorcycle riding on trails.

The Wilderness Study Area is open to motorized vehicle use, with the exception of the 3 mile primitive road to Lamphier Lake. This is closed to four-wheel vehicles. Motorized vehicle use is physically restricted to 42.7 trail miles over most of the WSA because of rough terrain and tree cover.

Current annual recreation use within the Wilderness Study Area is estimated to be 2,345 Recreation Visitor Days (RVD's). Table III-14 displays current recreation use by recreation activity.

Existing recreation settings within the Wilderness Study Area are classified pristine, primitive, semi-primitive, and roaded natural. The settings consider the area size, trail use, human influences within and from outside

the study area, opportunity for solitude, and potential for encountering other recreationists. Existing recreation settings for the WSA are displayed in Figure III-6.

TABLE III-14.

CURRENT RECREATION USE*
(Fossil Ridge Wilderness Study Area)

Recreation Activity	Activity Duration (Hours)	Length of Season (Days)	Total RVD's
Viewing Scenery	2.0	100	200
Foot (hiking & walking)	5.0	100	350
Horse (riding)	5.5	120	200
Motorcycles & Scooters	5.5	100	110
Watercraft (rafts, etc.)	4.5	80	75
Fishing, cold water	5.0	100	420
General camping	7.0	100	350
Tent camping	12.0	100	100
Picnicking	2.0	100	100
Recreation cabin	12.0	100	25
Hunting big game	6.0	40	340
Nature study (wildlife)	5.0	100	50
Nature study (hobby)	5.0	100	25
GRAND TOTAL			2,345

Source: * Estimated from Taylor River and Cebolla Ranger Districts 1980 Recreation Information Management Report.

FIGURE III-6.

RECREATION OPPORTUNITY SPECTRUM
(Fossil Ridge Wilderness Study Area)

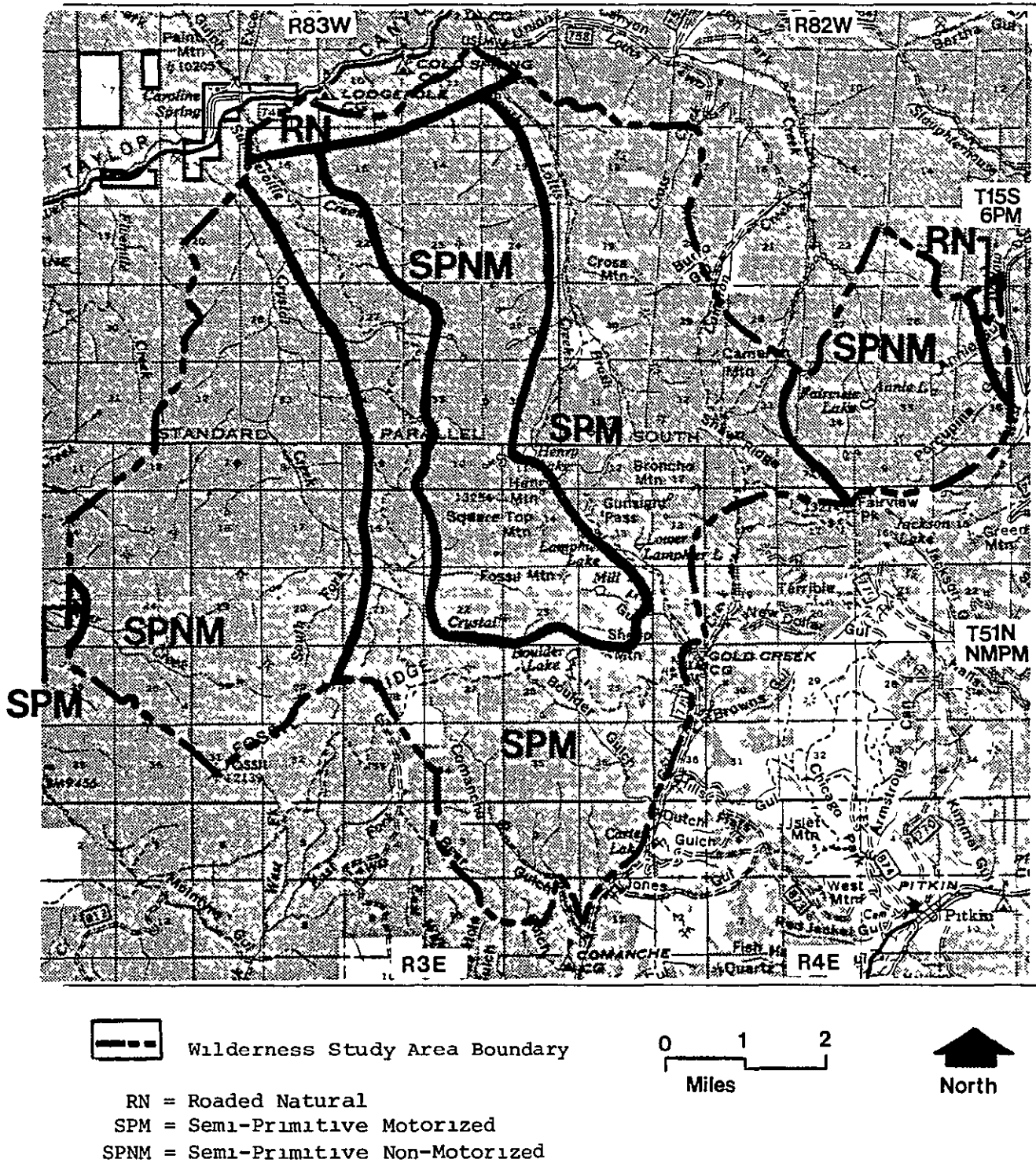


Table III-15 displays current capacity by Recreation Opportunity Spectrum (ROS) class for Fossil Ridge.

TABLE III-15.

CAPACITY SUMMARY
(Fossil Ridge Wilderness Study Area)

ROS* Class	PAOT*	Percent
Roaded Natural	189	26
Semi-Primitive Motorized	376	52
Semi-Primitive Non-Motorized	156	22
<u>TOTAL</u>	<u>721</u>	<u>100</u>

* ROS = Recreation Opportunity Spectrum
PAOT = People At One Time

Few cultural resource surveys have been completed for the WSA. Completed surveys have not located any cultural resources. Based on surveys in adjacent areas with similar topography and vegetation, cultural resource density is predicted to be low.

Approximately 2,700 acres of the Wilderness Study Area are being studied for inclusion in the National Natural Landmarks Program by the National Park Service. Current status is potential for designation. The presence of Paleozoic fossils in the sedimentary rock of the ridge is the unique feature of the area which is currently being considered.

Landscapes within the Rocky Mountain Region are grouped into character subtypes. The WSA contains two character subtypes. These character subtypes also include such well known landforms as Maroon Bells, the Eagles Nest, the Mount of the Holy Cross, and the highest peak in Colorado, Mt. Elbert.

Distinctive landscapes exist in 10% of the Wilderness Study Area. These landscapes include the Fairview Lake Basin; Lamphier, Lower Lamphier, Mill, Boulder Lake and Crystal Lake Basins; Henry Lake Basin; and two cirques west of Lottis Creek.

Eighty-one percent of the Wilderness Study Area is common landscape. Slopes are steep. There is less distinctive glacial landforms, mostly consisting of U-shaped valleys and subdued morainal features. Interesting landscapes include rock outcrops, cliffs, talus slopes, avalanche chutes, and small cirques. Vegetation variety is present. Coniferous forest and brush cover is combined with large natural openings and deciduous vegetation.

The remaining 9% consists essentially of landscape containing extensive areas of similar vegetation with little variation in pattern, form, color, or texture. This landscape is lacking in visual interest when compared to other landscapes in the WSA.

--Wilderness, Fossil Ridge - In RARE II, Fossil Ridge area was identified as the Crystal Creek Roadless Area. The Wilderness rating for Crystal Creek was 24. This rating was within the top 6% of all Colorado RARE II areas. The Fossil Ridge wilderness rating is 25.

Long-term ecological processes are intact and operating. The natural integrity is low to very low and the apparent naturalness is low. Impacts from physical development include primitive non-system roads in Cameron Gulch, Lottis Creek and near Lamphier Lake; primitive system roads for mineral resources in Cross creek, #752.2C (1.8 miles) and on Cameron Mountain, #752.2A (1.0 miles); cabins in Cameron Creek (private land), one mile west of Boulder Lake, and near Lamphier Lake (property of mining claim owners); fences on Shaw Ridge and in Cameron Creek; 42.7 miles of system trails. These impact over approximately 2% of the Wilderness Study Area. They have a low effect on natural processes, and a moderate to very high feasibility of being returned to a natural appearance. Impacts from mineral exploration and development are scattered throughout the Wilderness Study Area, but the area covered is insignificant. Recreation use has impacted the areas around lakes and along some trails. The area covered by these impacts is insignificant and has a moderate feasibility of being returned to a natural appearance. Impacts from grazing have created cow trails in Cameron Creek, Lottis Creek and Boulder Gulch. These trails impact about 5% of the Wilderness Study Area and could be separated with a change in boundary from the Wilderness Study Area. No impacts exist from utility Right-Of-Way, reservoirs, watershed management, special recreation facilities, wildlife management, vegetation treatment, insect and disease control, or non-indigenous plants and animals.

The Wilderness Study Area contains steep forested V-shaped valleys below timberline, cirque basins and headwalls, serrated ridges, sharp peaks and cliffs which provide a high topographic screening potential and a moderate vegetation screening potential. The distance from the perimeter to the core of the area is approximately 3 to 5 miles and some off-site intrusions are evident. Opportunity for solitude is very high.

Terrain varies from 9000 feet to 13,200 feet with cirque basins and headwalls, serrated ridges, sharp peaks and cliffs. Coniferous vegetation occurs over 60% and aspen occurs over 10% of the Wilderness Study Area. The Wilderness Study Area provides some challenges for the recreationist. Opportunity for primitive recreation is very high.

The 300 to 600 million year old limestone fossils are significant special geological features. They are also not unique to the Wilderness Study Area. Scenic values are distinctive or unique on 10% of the Wilderness Study Area.

Supplementary Wilderness attributes are significant. Table III-16 displays the current Wilderness Attribute Rating (WARS) for the Fossil Ridge Wilderness Study Area.

TABLE III-16.

WILDERNESS ATTRIBUTE RATING SUMMARY
FOSSIL RIDGE WILDERNESS STUDY AREA

Attribute	Rating
Influence on Natural Integrity	5 (Very Little)
Influence on Apparent Naturalness	5 (Very Little)
Solitude Opportunity	6 (Moderate)
Primitive Recreation Opportunity	6 (High)
Composite Wilderness Attribute Score	<u>22</u>
Supplementary Wilderness Attributes	3
<u>TOTAL</u>	<u>25</u>

The current WARS rating is one point higher than the Crystal Creek rating. The higher total reflects an improvement in the natural integrity rating resulting from the boundary change from Crystal Creek to Fossil Ridge.

Gunnison County contains 1,219,356 acres of National Forest System land. Of the National Forest System land; 305,067 acres; (25%) is currently wilderness.

Figure III-7 displays the Forest's portions of existing wilderness areas on the Forest.

Table III-17 displays wilderness areas on the Forest. Wilderness acres include acres outside the Forest boundary on other National Forests.

FIGURE III-7.

EXISTING WILDERNESS AREAS ON THE FOREST
(Proximity to Fossil Ridge Wilderness Study Area)

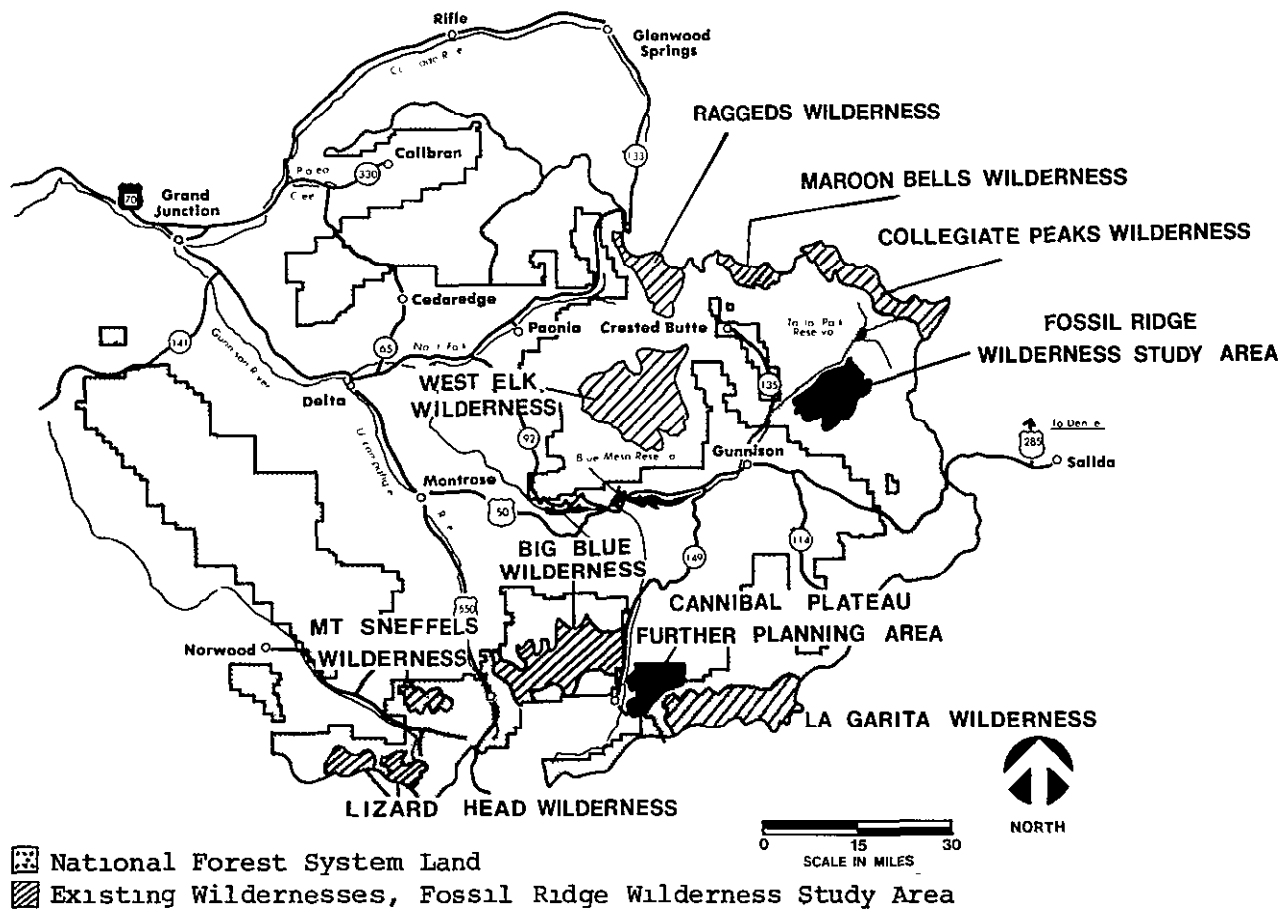


TABLE III-17.

EXISTING WILDERNESS AREAS LOCATED ON THE FOREST
(Proximity to Fossil Ridge Wilderness Study Area)

Wilderness	National Forest System Acres*	Distance From Fossil Ridge	
		Miles	Direction
Raggeds	59,105	26	Northwest
Maroon Bells-			
Snowmass	179,042	17	North
Collegiate	166,638	12	North
West Elk	176,092	20	West
Big Blue	98,235	48	South
La Garita	103,986	42	South
Mt. Sneffels	16,200	74	Southwest
Lizard Head	41,158	84	Southwest
TOTAL	840,456		

*Total wilderness acres regardless of Forest.

There are 739,500 wilderness acres within 50 miles, 2,136,000 wilderness acres within 100 miles and 2,582,400 wilderness acres within 150 miles of Fossil Ridge Wilderness Study Area.

--Fish and Wildlife, Fossil Ridge - The area is summer range for a small mule deer herd and an estimated 80 to 100 elk. Elk compete with cattle for forage on the high mountain meadows. Forage utilization by cattle is low enough to leave ample forage for elk. There is no winter range inside the Wilderness Study Area. This is the main factor limiting deer and elk populations. Aerial winter range surveys have not located any deer or elk in the WSA from December through April.

Elk calving was discussed briefly in the Draft Wilderness Study report. Local DOW officials will not identify elk calving areas as they feel their locations change from year to year, depending on snow depths and spring thaw.

The Friends of Fossil Ridge and others feel that the Wilderness Study Area is critical to elk management and elk hunting in the Wilderness Study Area contributes greatly to the local economy.

The Cooperative Big Game Study for the Mount Emmons Mining Project tracked 3 radio collared elk in the Fossil Ridge Area from July through October 1979. By November, the elk migrated southeast and southwest of Fossil Ridge to winter range in the 8,000 to 9,000 foot elevation range. Although no specific migration routes have been identified in the WSA, it appears that elk may migrate through the Comanche, Willow, Alder and Gold drainages on the south side of Fossil Ridge.

The Wilderness Study Area may be historic range for bighorn sheep, but there is no resident bighorn population in the WSA now. Bighorn sheep from the Taylor Canyon herd may occasionally drift through the Wilderness Study Area. A herd of about 7 mountain goats occupies the Henry Mountain area year round. These goats were once part of the herd in the Collegiate Peaks area. This herd is presently protected from hunting.

Other mammals in the area are: yellow-bellied marmot, pika, red squirrel, beaver, vole, coyote, porcupine, marten, black bear, snowshoe hare, long-tailed weasel, mountain lion, bobcat, and red fox.

White-tailed ptarmigan, blue grouse, and possible breeding pairs of green-winged teal and mallard are the only game birds in the WSA. Nongame birds use the forested areas and parks. Gray (Canada) Jay, downy and hairy woodpeckers, pine siskin, Clark's nutcracker, redtailed hawk, willow flycatcher, and yellow rumped warblers use the area. No amphibians or reptiles are known to exist in the Wilderness Study Area.

Crystal Creek, Summerville Creek, and South Lottis Creek contain brown trout. Crystal Lake, Boulder Lake, Mill Lake, Upper and Lower Lamphier Lakes, Fairview Lake, and Henry Lake have fisheries. The fisheries include yellowstone cutthroat and brook trout. Annie Lake, Cross Creek, and Boulder and Comanche Gulch are all small and cold. They do not support fishery populations. Cameron Creek contains fish. No information is available about fish size or productivity in Cameron Creek.

Few good fishing lakes exist on the Taylor River and Cebolla Ranger Districts. The concentration of six lakes attracts fishermen. Fishing pressure is light in all lakes except the Lamphier Lakes. Due to their small size, low temperatures and productivity, and periodic winterkill problems; most lakes cannot withstand heavy impacts. Aerial cutthroat trout planting occurs about every other year in the lakes.

There are no known threatened or endangered animals in the Fossil Ridge Wilderness Study Area. Bald eagles drift through Taylor Park and Taylor Canyon in the fall and may occasionally fly over part of the WSA, but the WSA is not bald eagle habitat.

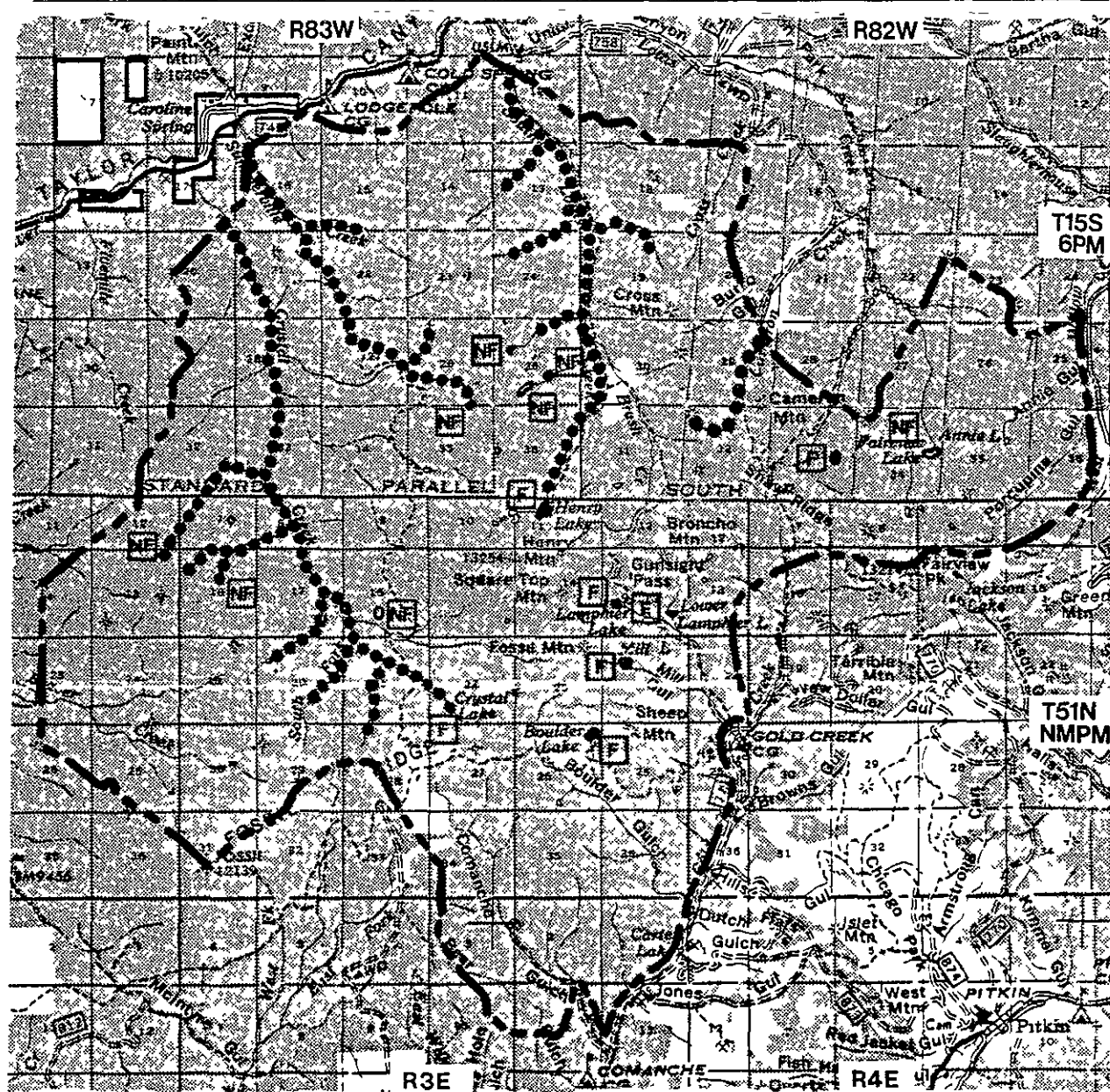
The National Audubon Society and others feel that threatened and endangered species do exist in the Wilderness Study Area. These include bald eagles, wolves, golden eagles, and peregrine falcon.





No wildlife habitat improvement projects have occurred in the Wilderness Study Area and no future projects are planned.

Figure III-8 displays fisheries data for the Wilderness Study Area.

FIGURE III-8.

FISHERIES



-  Wilderness Study Area Boundary
-  Lake with Fish
-  Lake with no Fish
-  Creeks with Sport Fishery Values

0 1 2
Miles



--Range, Fossil Ridge - The Wilderness Study Area contains portions of four cattle and horse allotments. Current grazing use is 697 Animal Unit Months on 3,478 acres of suitable range. The suitable range is in satisfactory condition with a static trend. All suitable range is used as summer pasture except 555 acres, 185 AUM's in the vacant South Lottis cattle and horse allotment.

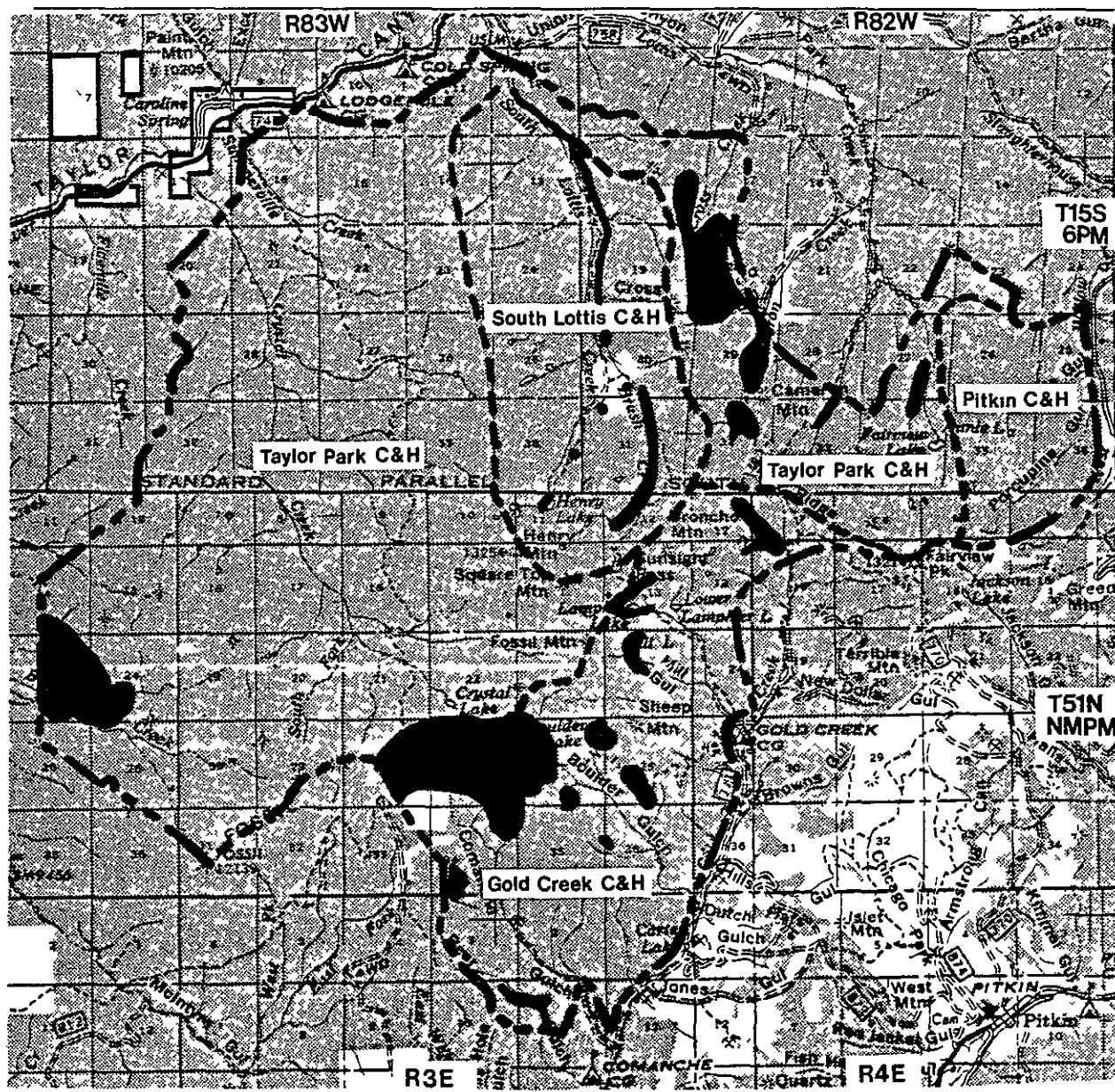
There is moderate to heavy recreation livestock use near all the lakes used for fishing. The use is primarily by outfitter stock. The balance of the area receives light to no recreation horse use.




One fence, approximately one mile long, is located in the WSA. It is on Shaw Ridge between the Gold Creek and Taylor Park Allotments. No additional structural improvements are planned.

Figure III-9 displays range resource information.

FIGURE III-9.

RANGE
(Fossil Ridge Wilderness Study Area)



-  Wilderness Study Area Boundary
-  Grazing Allotment Boundary
-  Suitable Range

0 1 2
Miles



--Timber, Fossil Ridge - The timber resources in the Wilderness Study Area are currently managed under the Gunnison National Forest Timber Management Plan. This Plan was approved November 13, 1975. The acres in the WSA were not used in the potential yield calculations for the Forest. The 31,781 forested acres in the Wilderness Study Area contain Englemann Spruce, Sub-Alpine Fir, Lodgepole Pine and Aspen. The acres are capable but not available for timber production. The acres are legislatively withdrawn by the 1980 Colorado Wilderness Act. The Wilderness Study Area contains approximately 339 million board feet of old growth sawtimber. Figure III-10 displays the timber resource.

--Water, Fossil Ridge - There are no precipitation records for the Wilderness Study Area. Precipitation is estimated to vary between 20 inches at the lower elevation (9200 feet) to over 40 inches at 12,500 feet. Snow is the dominant precipitation form.

The Wilderness Study Area is located on the watershed divide between the Taylor River and Gold Creek. The major drainages include Lamphier Creek, South Lottis Creek and Crystal Creek. The Wilderness Study Area produces an estimated 50,000 acre feet annually.

Data indicates that the water is high quality. This is typical of high altitude watersheds in the vicinity. There are no indications of bacteriological pollution, or pollution due to past mining activity. Chemical water quality samples generally show low nutrient levels and metallic parameters.

There are numerous small lakes located at high elevations within the glacier cirques.

Water yield could be increased by cutting timber in small clearcut units. Assuming vegetation treatments through commercial timber harvest only, an eleven percent increase, about 1,000 acre-feet per year, could be provided in the WSA. That increase amounts to about a two percent increase in water yield for the Fossil Ridge WSA.

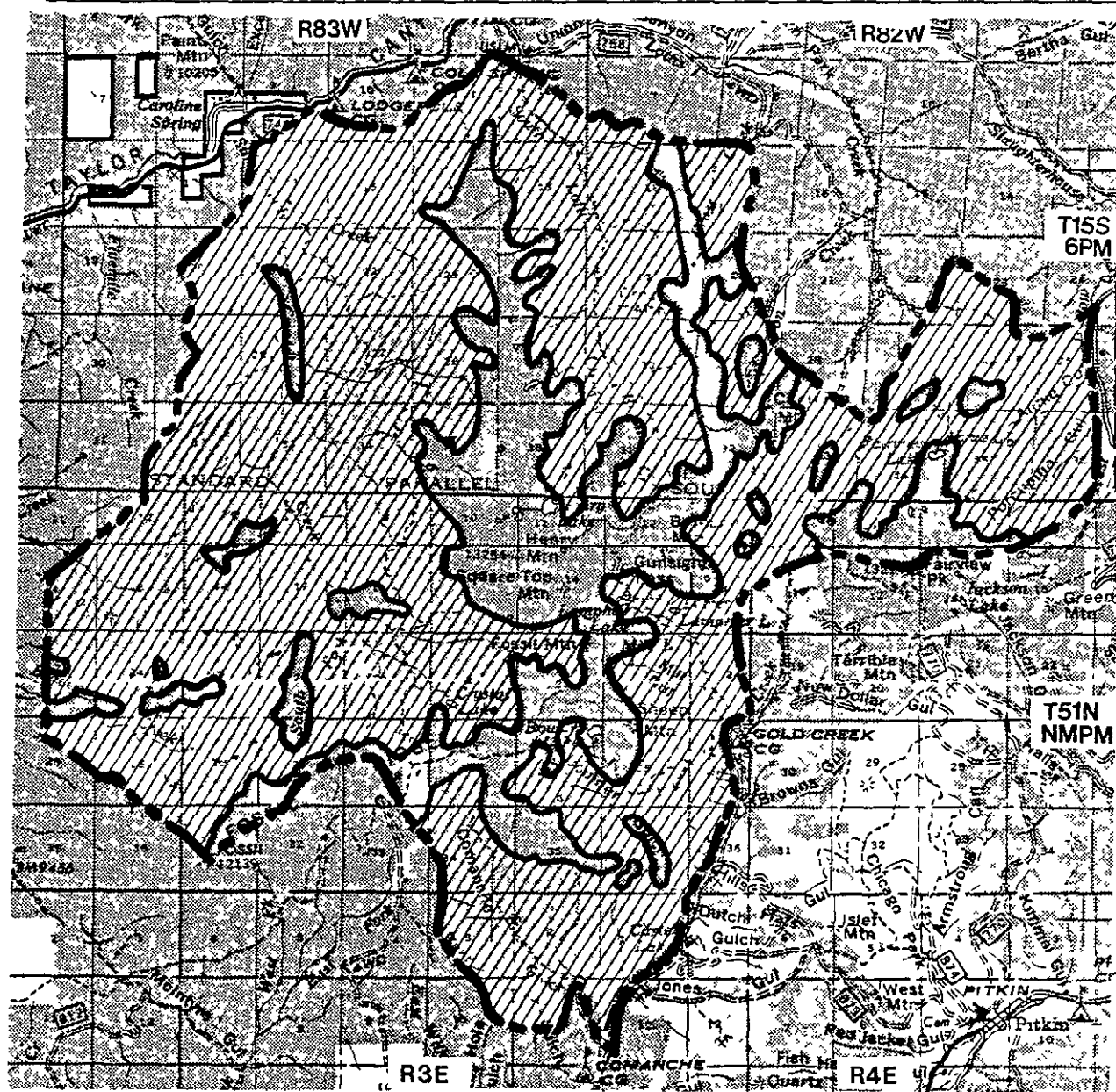
No existing or proposed impoundments, irrigation reservoirs, or distribution systems are located within the Wilderness Study Area. No decreed water rights exist according to Colorado Water Resource Division records.




There is a proposed reservoir planned for construction north of the WSA. See Figure III-11. The reservoir pool would be outside the WSA and dam construction activity would be over one mile from the north boundary of the WSA.

--Minerals, Fossil Ridge - There are no active mines in the Wilderness Study Area. The area has low potential for oil and gas. No leases or lease applications currently exist. The Wilderness Study Area has a moderate to high potential for locatable minerals including uranium, gold, silver, and molybdenum. It also has a moderate to high potential for high-calcium limestone. There are 465 acres of patented mining claims and 23,080 acres on 1,154 unpatented mining claims in the WSA. Figure III-11 displays patented and unpatented mining claims. The Friends of Fossil Ridge maintain that while there is evidence of some mineral potential in the Wilderness Study Area, there is also much evidence that the actual mineralization is low-grade and not marketable.

FIGURE III-10.

TIMBER
(Fossil Ridge Wilderness Study Area)



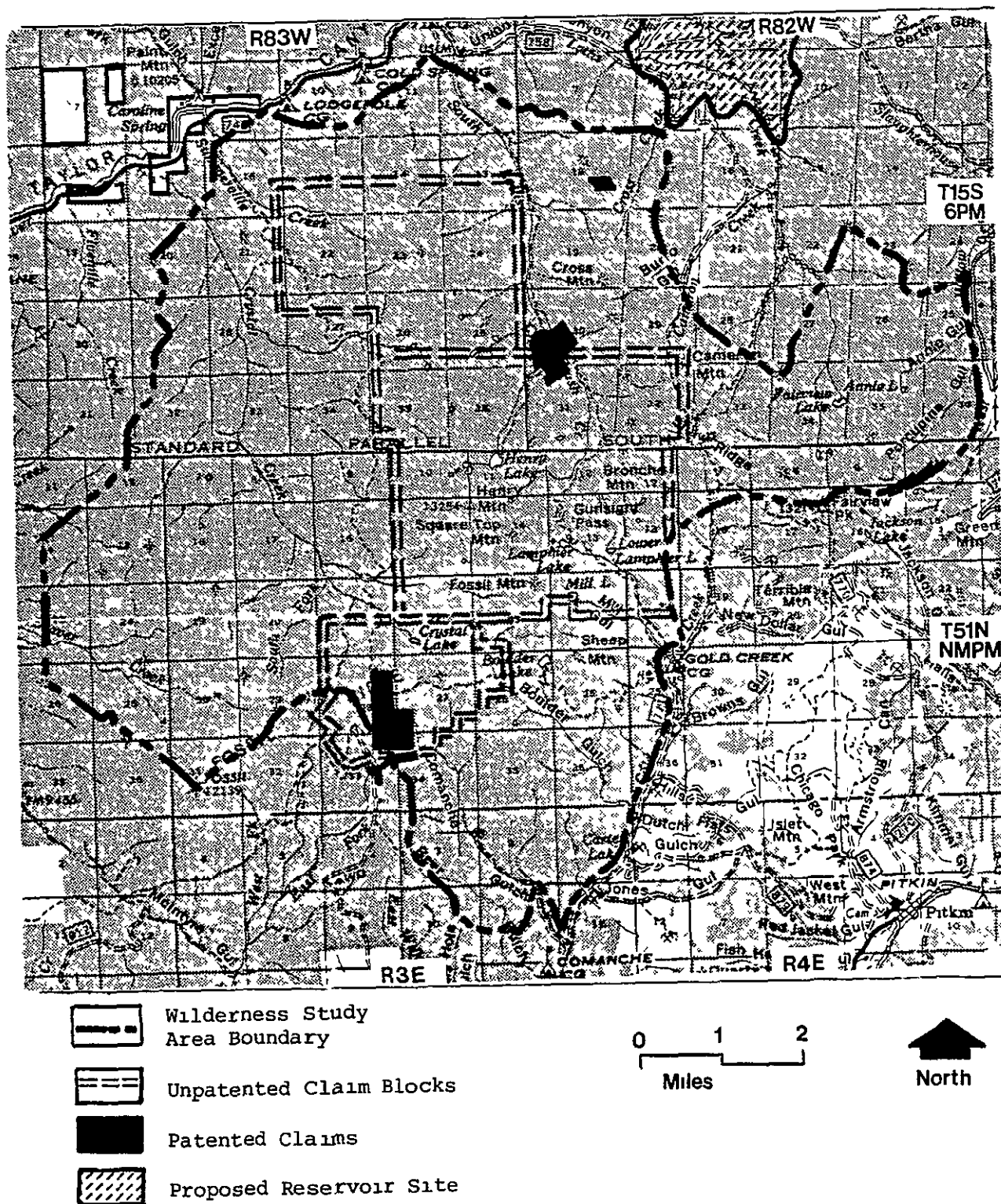
-  Wilderness Study Area Boundary
-  Non-Forest
-  Capable But Not Available Timberland

0 1 2
Miles



FIGURE III-11.

PATENTED AND UNPATENTED MINING CLAIMS
AND PROPOSED RESERVOIR SITE
(Fossil Ridge Wilderness Study Area)



Exploration companies have been working in the Wilderness Study Area for several years. Interest was generated by similarities between portions of the Wilderness Study Area and the Homestake Pitch Mine, which is a uranium mine near Marshall Pass. Field studies have located areas of lowgrade mineralization. No ore bodies have been announced. The general interest areas include Fossil Ridge, the ridge between Crystal Creek and South Lottis Creek, and the Henry Mountain-Fairview Peak area.

The Gold Brick District, at the southeast edge of the Wilderness Study Area, has produced gold and silver for nearly a hundred years. The mineralization in the District is associated with veins and faults that were created during the early Tertiary period. Very little production has come out of the WSA, but numerous prospect pits and exploration adits are present in its southern portions. Additional gold and silver production has come from properties on the northeast side of the Wilderness Study Area, including Cross Creek and the Tincup vicinity. It is possible that similar mineralization patterns are present within the Wilderness Study Area. Poor access and lack of detailed mapping account for the current absence of discoveries.

Exploration for molybdenum is currently underway near Cumberland Pass on the east side of the Wilderness Study Area. Some high molybdenum values have been discovered in the area. These were encountered in connection with uranium exploration.

Leadville Limestone in the Wilderness Study Area is unusually pure. Its calcium-magnesium ratio is high. Exploration is currently underway in the southern part of the WSA to determine the extent of this occurrence. Colorado Minerals Corporation indicates they are ready to initiate development work on a mine but no operating plan has been submitted to the Forest.

Copper and iron have been discovered. No ore bodies have been announced. No exploration is currently being conducted for copper and iron.

The U.S. Geologic Survey and Bureau of Mines conducted a field survey in 1982. A joint report is to be published, but the release date has not been established.

--Lands, Fossil Ridge - The Wilderness Study Area contains 47,400 acres of National Forest System land within the Gunnison National Forest. There are five non-contiguous blocks of patented mining claims totalling 465 acres. Four of the five non-contiguous blocks of patented mining claims within the Wilderness Study Area have been identified for acquisition in the Gunnison National Forest Land Classification and Land Adjustment Plan. A Priority III, or land that is desirable for National Forest status, has been assigned to this non-Federal land.

The fifth unpatented claim block, which parallels the Wilderness Study Area boundary near Fairview Peak has not been inventoried for acquisition.

Prospects that the Federal Government acquiring these patented mining claim blocks through purchase, exchange or donation is currently judged to be very low.

Access to the two patented mining claim blocks in Commanche Gulch, the patented mining claim block in Cross Creek, and the Fairview Peak block is presently available over an existing, low standard four-wheel drive trail. Access to the patented mining claim block in the South Lottis Creek Drainage is only available over a developed Forest Service trail system.

Figure III-11 displays patented and unpatented mining claims. There are no encumbrances on public land in the Wilderness Study Area. There are four outfitter and guide special use permits for the WSA.

--Protection, Fossil Ridge - Air quality in the Fossil Ridge Wilderness Study Area is nearly pristine. The area is designated as a Class II area and meets Class I standards. High levels of suspended particulates found in the nearby valleys do not extend into Fossil Ridge due to topography and airflow patterns. There are no existing or planned facilities in the general area that meet the definition of major emitting facilities.

Only four wildfires have been recorded in the Wilderness Study Area since 1950. Three were man-caused and one lightning caused. They ranged in size from one-tenth acre to 200 acres for a total of 220 acres burned over the past 33 years.

Fuels are building in the forested areas because of fire protection and no timber harvesting.

The forest stands in the Wilderness Study Area are presently progressing through natural ecological change and are more subject to insect and disease attacks than managed stands.

Portions of the lodgepole pine stands are infected with dwarf mistletoe. Old growth stands are infected with various kinds of fungi. Bark beetle infestations are very light and scattered in both the lodgepole pine and spruce stands. None of the infestations are of major proportions.

--Facilities, Fossil Ridge - The Fossil Ridge Wilderness Study Area has 2 system roads. This includes 2.8 miles classified as local roads constructed for mineral resource activities. Roads are managed to achieve the maximum public good with the available budget. Some roads are closed to protect wildlife values, prevent resource damage, and reduce road maintenance costs. The present travel management status is displayed on the Forest Travel map. This map is available at Forest Offices. The non-system primitive road or jeep trail to Lamphier Lake has been closed to motorized travel.

The Wilderness Study Area has 9 system trails with a total length of 42.7 miles. No administrative facilities, dams, bridges, water systems, or waste-water treatment plants exist in the Wilderness Study Area.

Cannibal Plateau Further Planning Area - The RARE II Final EIS listed Cannibal Plateau a Further Planning Area. The Colorado Wilderness Act retained its designation as a Further Planning Area (FPA).

Suitability or unsuitability for inclusion in the National Wilderness Preservation System is determined by physical, biological, social, and economic characteristics. This section describes the affected environment and demand trends in the Cannibal Plateau Further Planning Area.

--Vegetation, Cannibal Plateau - The Further Planning Area includes two alpine plateaus, Cannibal and Calf Creek. The lower elevations are characterized by open grassy parks surrounded by aspen and Engelmann spruce. The higher elevations are alpine vegetation interspersed with large areas of willow. Understory at lower elevations include Fendler bluegrass, spike trisetum, russet buffaloberry, common juniper, rockcress, elk sedge, senecio, Idaho fescue, Thurber fescue, and cinquefoil. At higher elevation understory includes Kobresia, alpine fescue, moss campion, spike trisetum, alpine bluegrass, low-growing sedges, alpine paintbrush, western yarrow, cinquefoil, and alpine willow.

The Colorado Open Space Council and The Wilderness Society feel that the Further Planning Area has a major value for on-going biological research.

There are no known Federally or state-designated threatened or endangered plants or animals in the Further Planning Area.

--Landform, Cannibal Plateau - The plateaus range from 11,000 to 12,500 feet. Predominant aspects in the FPA are east and southwest. Slopes vary from less than five percent to greater than one hundred percent. The majority of the area is flat to gently sloping.

The area is basically volcanic rock. The volcanic rock has been altered by ascending gases and superheated water. Lava flow, which varies in depth from 5 to 200 feet, occurred during the Tertiary Age between 10 and 35 million years ago. Pleistocene glaciation, up to 10,000 years ago, altered the landscape and created cirque basins, moraines, and rock glaciers.

The Slumgullion Earthflow is a unique landform located within and outside the Further Planning Area. The earthflow is slightly more than 1,000 acres. National Forest System acres total 300. It is about four miles long and 2,000 feet wide at its widest point. The earthflow illustrates the mass wasting geologic process.

About seven hundred years ago a huge rock mass, saturated with water from rain and melting snow, slumped from the mountainside and flowed like a viscous liquid down a tributary valley to the main valley of the Lake Fork of the Gunnison River. It spread laterally both upstream and downstream. The resulting dam formed Lake San Cristobal. The older flow is presently overridden by a new flow which may have begun about three hundred years ago. Movement along this flow is as great as twenty feet per year in some areas.

--Geology, Cannibal Plateau - The Further Planning Area is underlain by volcanic Tertiary rocks which rest on top of Precambrian crystalline rocks. The U.S. Geologic Survey has estimated the thickness to be 4,000-5,000 feet in the north part of the Further Planning Area. A similar thickness is expected to be present throughout the rest of the Further Planning Area. No prominent geological structures have been identified. The eastern rim of the Uncompahgre caldera lies buried under 2,000 feet of volcanic material at the southwest edge of the Further Planning Area. The Lake City caldera lies west of Lake City.

--Soils, Cannibal Plateau - The closest soils information for the Cannibal Plateau Further Planning Area is the Hinsdale-Saguache Soil Survey. This is adjacent to the FPA. This survey indicates several soil series could occur. The two typical ones are: Meredith series on alpine areas and Nutras series on subalpine timbered sites.

Meredith series are associated with alpine vegetation above timberline. These soils are very cold, 20 to 40 inches deep, and well drained. Rock content in the soils is very high. Revegetation is difficult on these soils due to cold temperatures and high rock content.

Nutras soils occur at elevations below timberline associated with Engelmann spruce vegetation. These are cold, deep, well drained soils. Rock content is variable, but generally high.

Rock outcrops and rock slides are interspersed with these soils throughout the area. A more detailed soil description is located in the Soil Survey and Interpretations for Parts of Hinsdale and Saguache Counties, Gunnison National Forest.*

--Social and Economic Setting, Cannibal Plateau - The Cannibal Plateau FPA is within the Gunnison Human Resource Unit (HRU).** Settlement at Lake City began when gold and silver were discovered. In 1877, it was unrivaled in population and size on the western slope of Colorado. It possessed a booming mining industry and was a supply point for Animas Forks, Silverton, Ouray, Mineral City, Capitol City, and other small San Juan mining camps. The Denver and Rio Grande Railroad reached Lake City in 1889.

--Population, Employment, and Income, Cannibal Plateau - Hinsdale County contains one of the smallest populations of any county in the Nation. The 1970 census indicated a population of 202. In 1980, population reached 408. Lake City is the only incorporated town in the county. During the summer and fall the Lake City area population swells. It is estimated the summer/fall population of Hinsdale County is 5,000 persons.***

Lake City's economy is predominately tourism. This tends to be a very seasonal situation. Summer tourism is the mainstay of the County's economy. Spectacular scenery, large tracts of mountainous public land, lodging facilities, past mining activity, and numerous opportunities for outdoor recreation have combined to make Hinsdale County a popular tourist area. Jeep rentals and jeep tours are an important part of the tourist industry in the Lake City area. Lake City's economy is tied in a large part to the availability of motorized recreation including snowmobiling in the winter.

Source: *Soil Conservation Service, preliminary publication, January 1979.

**Proposed Wilderness Management Plan, Grand Mesa, Uncompahgre and Gunnison National Forests, October 25, 1982. USDA Forest Service.

***"Solid Waste Options for Lake City, Colorado," Fred C. Hart Associates, Inc.

In an attempt to bolster the County's weak winter economy, the Hinsdale County Chamber of Commerce and local businessmen have promoted snowmobiling and cross-county skiing as winter industries. Both are increasing in popularity.

Twenty-eight ranches operate in the County. The average ranch supports a 65 cow operation. Most valley ranches are dependent on Federal land for summer pasture.

The mining industry historically provided economic stability in the County. Extensive exploration for uranium and molybdenum is occurring near Lake City. As mineral market values rise, the County could expect to experience continued mineral exploration.

- Lifestyles, Cannibal Plateau - A rural lifestyle predominates the area. Recreation and tourism are growing industries. Ranching and mining, while long-time sustaining industries in the County, have been declining in economic importance.

Sightseeing, hunting, fishing, and snowmobiling are major recreation activities. They provide significant Forest use within the surrounding area and impact the Lake City economy.

- Attitudes, Beliefs, and Values, Cannibal Plateau - Interest and concern about Federal Land and Resource Management is high. The Lake City economy is seasonal in nature and local officials have indicated industrial growth is needed to enhance community growth and stability.* Public issues indicate support for and opposition to wilderness. Publics opposed to wilderness view wilderness as a threat to the economic stability of the county. A large percentage of the county is wilderness. Further wilderness would weaken the area's economic base by taking land out of production. There is strong opposition to restrictions on motorized vehicles.

Those of the public in favor of additional wilderness view it as necessary to preserve areas in a natural state for their scenic quality, scientific value, and wildlife habitat.

- Social Organization, Cannibal Plateau - Hinsdale County is a large, rural unit. Limited fire, law enforcement, search and rescue, medical, local news media, local planning, and trade services are available. Most residents travel outside the county for major purchases.

- Population and Land Use, Cannibal Plateau - Hinsdale County contains one of the smallest populations of any county in the Nation. Lake City is the only incorporated town. Lake City's economy is predominately tourism. Tourism and Lake City's economy depend heavily on surrounding public land.

- Recreation, Cannibal Plateau - Current annual recreation use within the Further Planning Area is estimated to be 1,750 Recreation Visitor Days. A major recreation use on Cannibal Plateau is snowmobiling which accounts for 29% of the annual use.

Source: * Scoping conducted for Grand Mesa, Uncompahgre and Gunnison National Forests Land and Resource Management Plan.

Outfitters and snowmobile enthusiasts value the plateau for its large, flat, wide-open area and expansive scenic views. The only other major recreation use is big game hunting. Table III-18 displays current recreation use by recreation activity.

TABLE III-18.

CURRENT RECREATION USE*
(Cannibal Plateau Further Planning Area)

Recreation Activity	Activity Duration (Hours)	Length of Season (Days)	Total RVD's
Snowmobiling	5.0	120	500
Viewing Scenery	2.5	120	100
Hiking & Walking	5.0	120	200
Horseback	5.0	120	200
Fishing-Cold Water	2.5	120	150
Camping-General	7.0	120	100
Hunting-Big Game	6.0	20	500
TOTAL			1,750

Existing recreation settings are classified pristine, primitive, semi-primitive, and roaded natural. The settings consider the areas size, trail use, human influences within and from outside the planning area, opportunity for solitude, and potential for encountering other recreationists. The existing setting for Cannibal Plateau Further Planning Area is displayed in Figure III-12. Table III-19 displays current capacity by recreation opportunity spectrum class for Cannibal Plateau.

TABLE III-19.

CAPACITY SUMMARY
(Cannibal Plateau Further Planning Area)

ROS** Class	PAOT**	Percent
Semi-Primitive Motorized	516	96
Semi-Primitive Non-Motorized	23	4
TOTAL	539	100

* ROS = Recreation Opportunity Spectrum
PAOT = People-At-One-Time

Source: *Estimated from Cebolla Ranger District 1980 Recreation Information Management Report and Gunnison Basin Resource Area Recreation Use Records.

Three permits are issued annually for outfitters and guides in the FPA. The area includes 30.2 miles of trail.

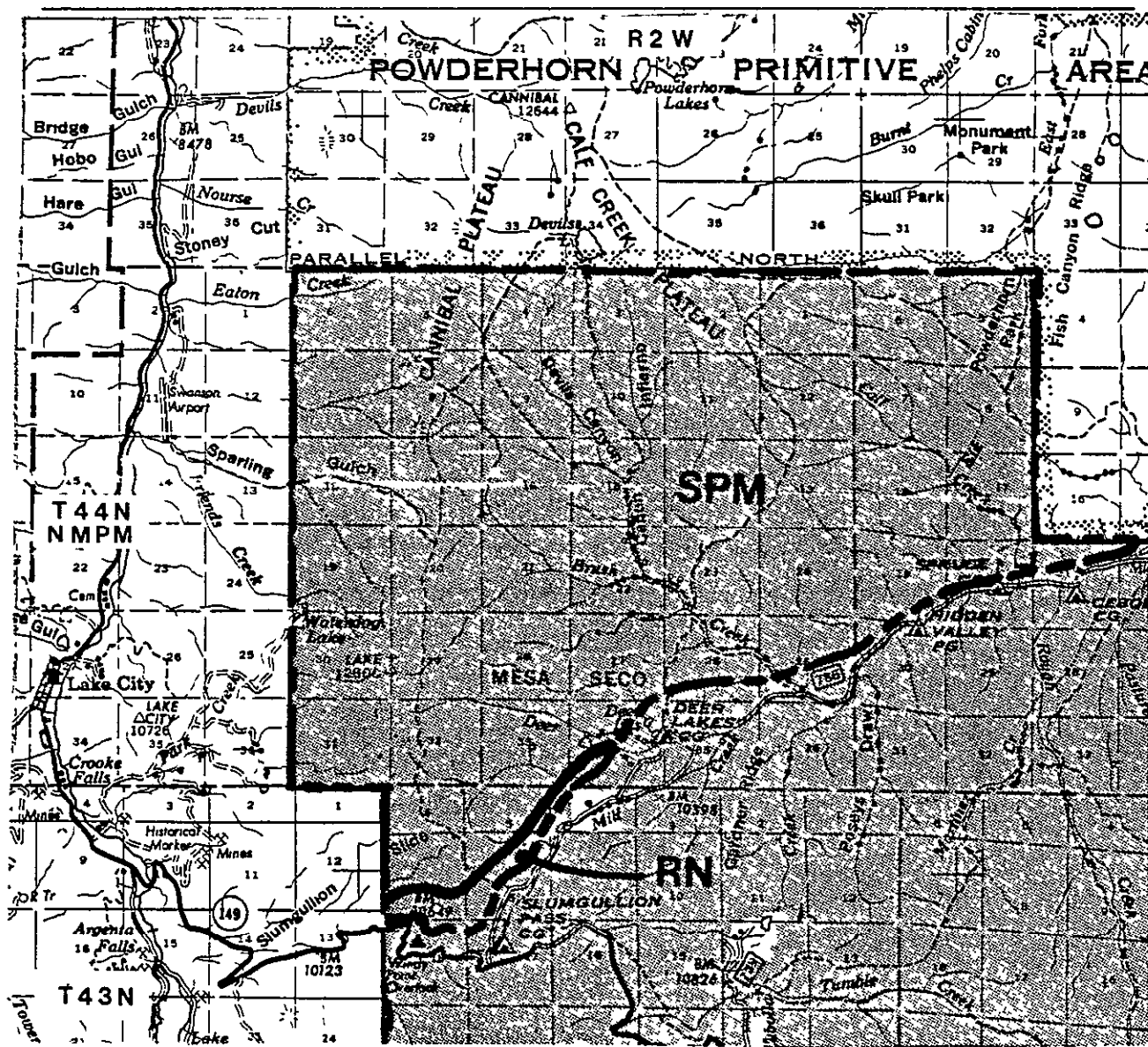
No cultural resource surveys have been conducted in the Further Planning Area. No statement can be made on specific cultural resources for this Further Planning Area. However, cultural resource density within this FPA is estimated to be low based on surveys in adjacent areas with similar topography and vegetation.

The Slumgullion earthflow, located within the Cannibal Plateau Further Planning Area, is a natural geologic process associated with the erosion of unstable geologic and soil features. It includes approximately 900 acres of BLM administered land, 300 acres of National Forest System land, and 100 acres of private land. It is located two miles south of Lake City. It is designated a National Natural Landmark and is listed in the National Registry of Natural Landmarks. It is not a registered landmark since all owners have not agreed to protect its value.

Landscapes within the Rocky Mountain Region are grouped into character subtypes. The FPA contains two character subtypes. These character subtypes also include landforms such as the San Juan Mountains, La Plata Mountains, La Garita Hills, and the Cochetopa Hills.

FIGURE III-12.

RECREATION OPPORTUNITY SPECTRUM
(Cannibal Plateau Further Planning Area)



Further Planning Area Boundary

RN =Roaded Natural
SPM =Semi-Primitive Motorized



One percent of the Further Planning Area consists of the upper portion of the exposed rock escarpment of the Slumgullion Earthflow. This escarpment contrasts sharply with nearby vegetation. Horizontal colorbands within the escarpment contrast with surrounding soils.

Flat to rolling topography with a mosaic of vegetation types occurs on 94% of the Further Planning Area. Landform diversity ranges from narrow steep-sloping stream bottoms to broad gently rolling sidehills and bowl-shaped mountain valleys. Landforms include Calf Creek and Cannibal Plateaus and Mesa Seco. Drainages flow southeast into Cebolla Creek. Coniferous forest and brush cover is combined with large natural openings and alpine willow ecosystem.

Five percent includes high alpine zones. This landscape encompasses one of the largest, relatively flat alpine vegetation areas in the contiguous United States. Landforms consist of broad boulder fields with flat to rolling slopes and windswept ridges. Vegetation is sparse. Extensive areas contain vegetation with little variation in pattern, form, color, or texture. The landscape lacks visual interest as compared to other landscapes in the area.

--Wilderness, Cannibal Plateau - The RARE II wilderness rating for Cannibal Plateau was 22. This rating was within the top 10% of all Colorado RARE II areas.

Long-term ecological processes are generally intact and operating. The natural integrity is moderate and the apparent naturalness is very low. Impacts from physical development include one unimproved trail on Mesa Seco and one primitive system road in Brush Creek, #788.1H (1.3 miles); one utility Right-Of-Way translator tower; 3 stock ponds and a small dam scattered throughout the Further Planning Area. Natural processes on these spots have been significantly interrupted. The impacted area covers less than 1% of the Further Planning Area. Several small drift fences and 30.2 miles of system trails exist on approximately 1% of the Further Planning Area. They have low to no effect on natural processes and moderate feasibility of being returned to a natural appearance. Impacts from grazing cover the entire Further Planning Area and have made a moderate impact on natural processes resulting in some terracing and vegetation change on approximately 6% of the Further Planning Area. There is little feasibility of returning these changes to a natural appearance. Non-indigenous plants and animals such as low exotic weeds have been introduced throughout the Further Planning Area.

No impacts exist from watershed management, special recreation facilities, fixed site facilities, mineral exploration and development, wildlife management, vegetation treatment, or insect and disease control.

The Further Planning Area contains some steep rugged canyons and some gradual rolling and flat plateaus which provide a moderate topographic screening potential. Half the area is above timberline. Vegetation screening is moderate. With the adjacent Powderhorn primitive area the distance from the perimeter to the core of the area is approximately 6 miles. Off-site mineral intrusions are evident. The opportunity for solitude is high.

Terrain varies from 11,000 to 12,500 feet with steep rugged canyons to flat or rolling plateau with a good variety of mammals and vegetation. The Further Planning Area provides few challenges for the recreationist. Opportunity for primitive recreation is very high.

Supplementary Wilderness attributes are insignificant. Table III-20 displays the current Wilderness Attribute Rating for the Cannibal Plateau Further Planning Area.

TABLE III-20.

WILDERNESS ATTRIBUTE RATING SUMMARY
CANNIBAL PLATEAU FURTHER PLANNING AREA

Attribute	Rating
Influence on Natural Integrity	4 (Moderate)
Influence on Apparent Naturalness	6 (Very Little)
Solitude Opportunity	5 (High)
Primitive Recreation Opportunity	6 (Very High)
Composite Wilderness Attribute Score	<u>21</u>
Supplementary Wilderness Attributes	<u>1</u>
TOTAL	22

Two existing wildernesses, one designated primitive area, and two BLM Wilderness Study Areas are readily accessible from Lake City. These serve the same general population centers and user groups. In this area, wilderness acreage increased 153,735 acres with the 1980 Colorado Wilderness Act. The two wildernesses total 202,221 acres. If the Powderhorn Primitive Area and the two BLM Wilderness Study Areas are designated wilderness; 265,432 wilderness acres will be in close proximity to Cannibal Plateau.

Hinsdale County contains 553,801 acres of National Forest System land. Of the National Forest System land; 266,638 acres; or 48% is currently wilderness.

There are 904,700 wilderness acres within 50 miles, 1,699,800 wilderness acres within 100 miles, and 1,830,809 wilderness acres within 150 miles of Cannibal Plateau Further Planning Area.

Table III-21 displays wilderness areas on the Forest. Wilderness areas include acres outside the Forest boundary on other National Forests.

TABLE III-21.

EXISTING WILDERNESS AREAS LOCATED ON THE FOREST
(Proximity to Cannibal Plateau Further Planning Area)

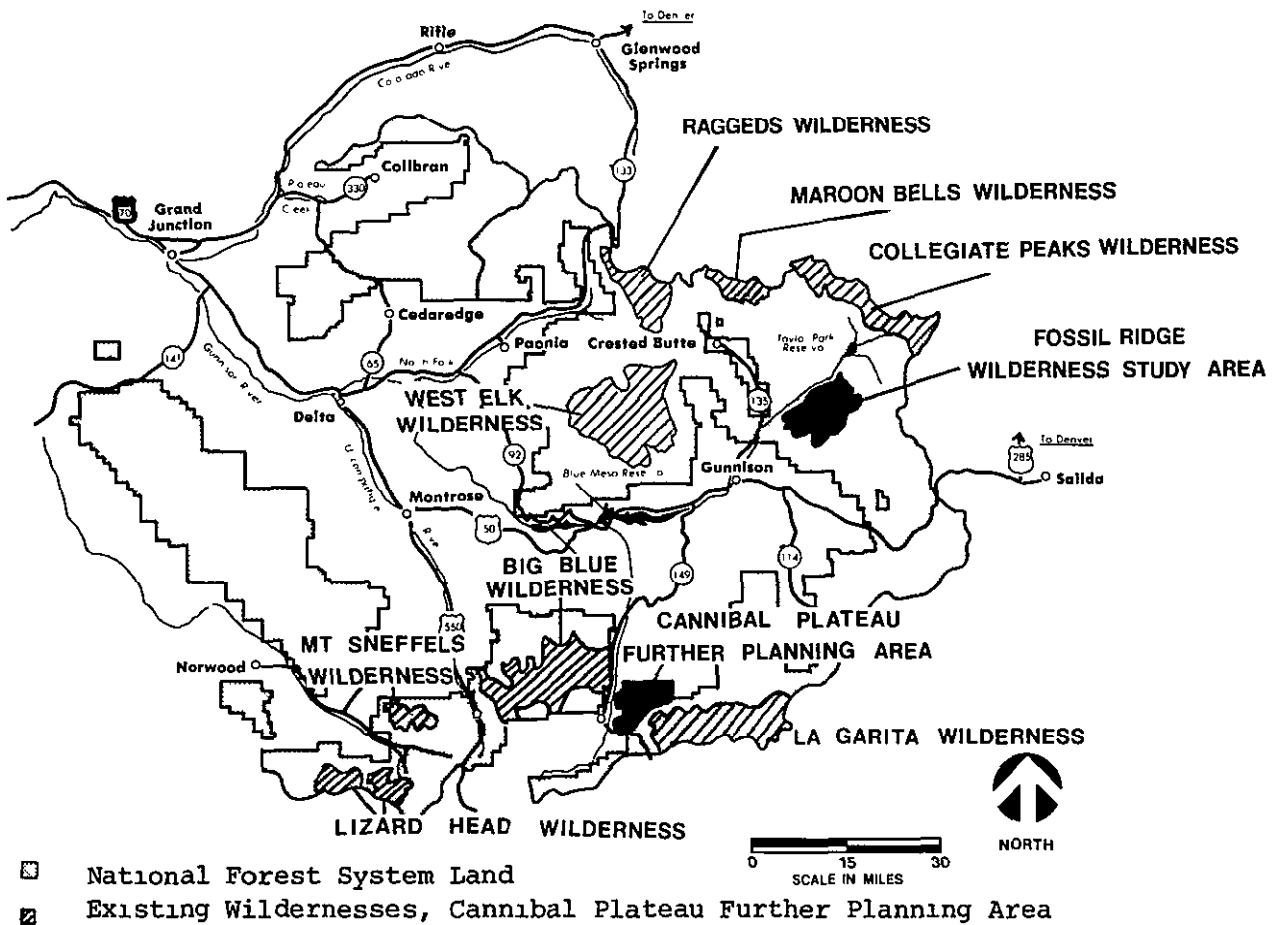
Wilderness	National Forest System Acres*	Distance From Cannibal Plateau	
		Miles	Direction
Raggeds	59,105	56	North
Maroon Bells-			
Snowmass	179,042	68	North
Collegiate	166,638	62	Northeast
West Elk	176,092	30	North
Big Blue	98,235	2	West
La Garita	103,986	1	Southwest
Mt. Sneffels	16,200	35	West
Lizard Head	41,158	26	Southwest
<u>TOTAL</u>	<u>840,456</u>		

*Total wilderness acres regardless of Forest.

Figure III-13 displays existing wilderness areas on the Grand Mesa, Uncompahgre and Gunnison National Forests.

FIGURE III-13.

EXISTING WILDERNESS AREAS ON THE FOREST
(Proximity to Cannibal Plateau Further Planning Area)



--Fish and Wildlife, Cannibal Plateau - The area is summer range for deer and elk. Large grassy parks and willow fields on Cannibal Plateau, Calf Creek Plateau, and Mesa Seco are valuable elk summer range. Some winter range occurs along Cebolla Creek. Although no specific migration routes have been identified in the Further Planning Area, it appears elk migrate to lower BLM land to the north and west. Winter range shortage in the Further Planning Area is the main factor limiting deer and elk populations. Small parks and meadows could be used for elk calving in years of early snow melt.

No bighorn sheep or mountain goats inhabit the Further Planning Area.

Other mammals in the FPA are: beaver, coyote, black bear, marten, snowshoe hare, mountain lion, bobcat, vole, pika, porcupine, and yellow-bellied marmots.

White-tailed ptarmigan, blue grouse, mallard ducks and greenwinged teal are the only game birds in the area. Nongame birds include the gray (Canada) jay, pine siskins, Clark's nutcracker, red-tailed hawk, willow flycatcher, robin, and downy woodpeckers. Bird concentration is in the riparian ecosystem and the forest-park edges. No amphibians or reptiles are known to exist in the Further Planning Area.

Deer Creek, Brush Creek, and the North Fork of Mill Creek have excellent fisheries. Fishing pressure is light. The fisheries include brown and brook trout and cutthroat trout. Waterdog is the only lake in the Further Planning Area. The remaining creeks are small. There is no stream survey information on these creeks. All but Canon Inferno Creek are small and too cold to support fisheries. Figure III-14 displays the fisheries resource for the Further Planning Area.

There are no known threatened or endangered species in the Cannibal Plateau Further Planning Area.

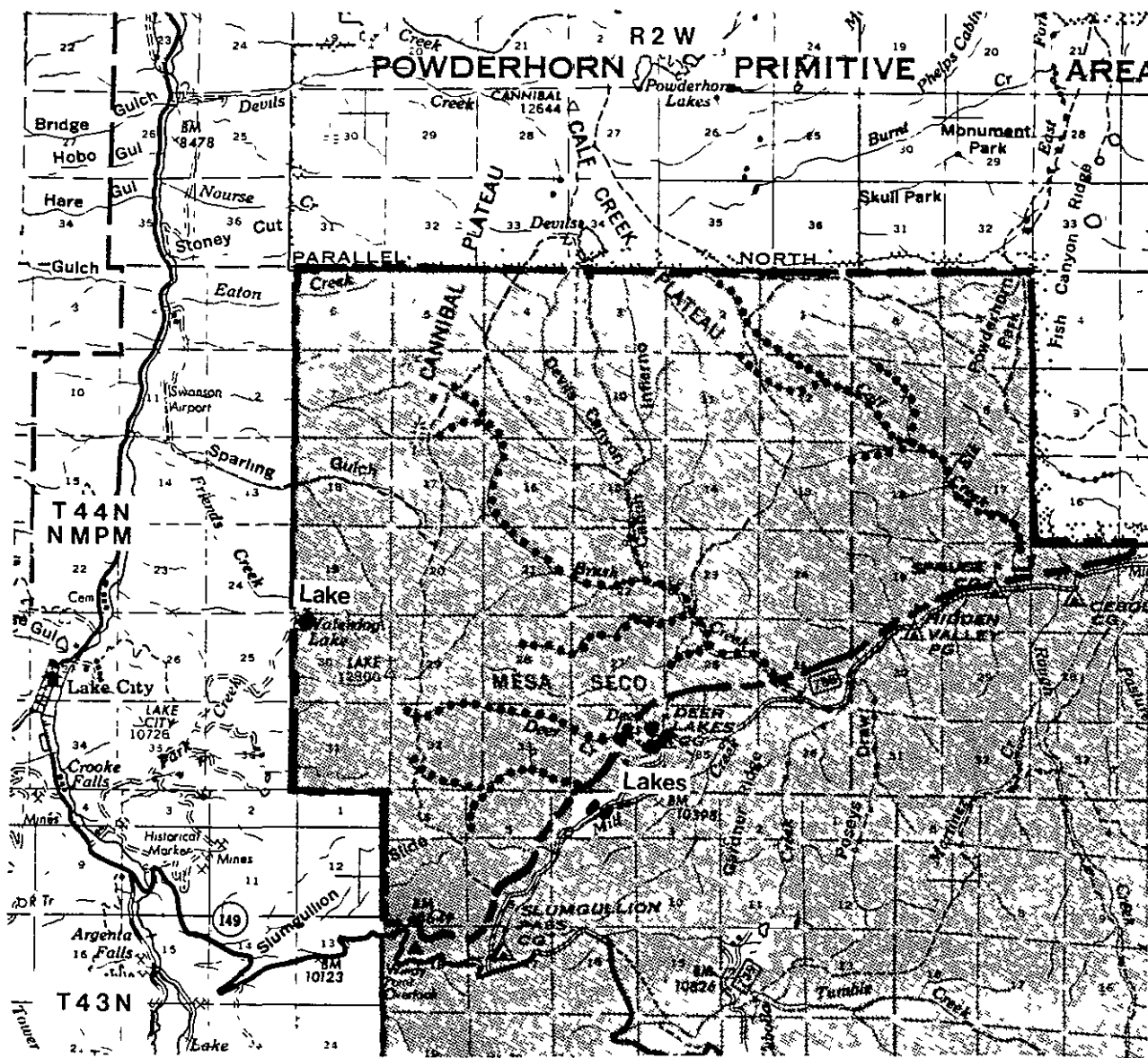
--Range, Cannibal Plateau - The Further Planning Area contains two cattle and horse allotments and two sheep and goat allotments. Current grazing use is 4,716 Animal Unit Month's on 10,705 acres of suitable range. All suitable range is used as summer pasture. Figure III-15 displays the range resource.

The area receives light recreation horse use. Use is primarily by outfitter stock during big game hunting seasons. There are two stock ponds, two water developments, and .65 miles of fence. Eleven water developments and one mile of fence are scheduled for the Further Planning Area.

--Timber, Cannibal Plateau - The timber resources in the Further Planning Area are currently managed under the Gunnison Timber Management Plan. This Plan was approved November 13, 1975. The acres were not included in the potential yield calculations for the Forest. The 17,410 forested acres in the Further Planning Area contain Englemann Spruce, Sub-Alpine Fir and Aspen. The acres are capable, available and tentatively suitable. The Further Planning Area contains approximately 175 million board feet (MMBF) of old growth sawtimber. Under current management, the acres are surplus to the timber production objectives of this Forest. Figure III-16 displays the forested acres for the Further Planning Area.

FIGURE III-14.

FISHERIES
(Cannibal Plateau Further Planning Area)



Further Planning
Area Boundary



Miles



North



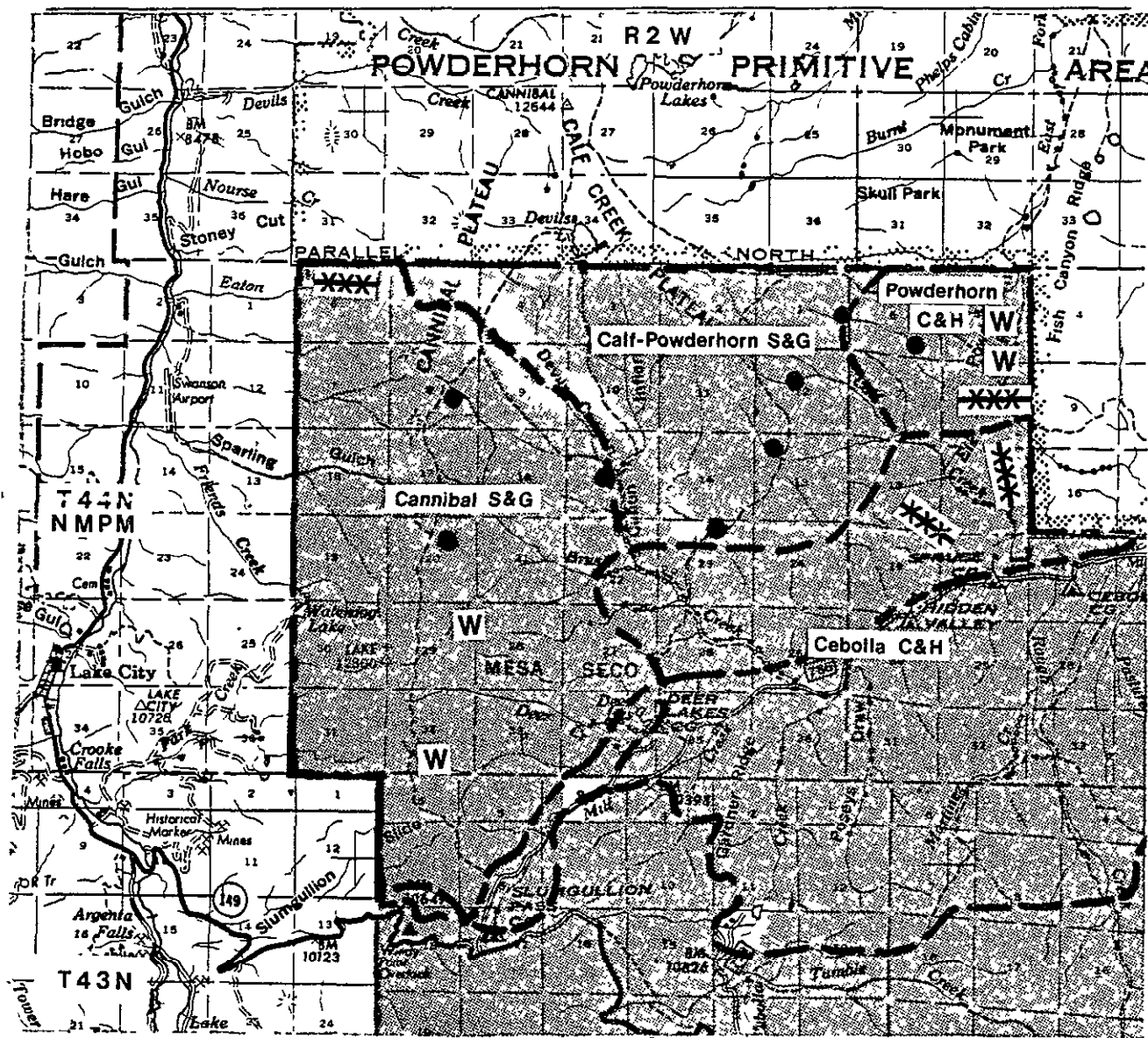
Lake with Fish







Creeks with Sport
Fishery Values

FIGURE III-15.

RANGE
(Cannibal Plateau Further Planning Area)



-  Further Planning Area Boundary
-  Grazing Allotment Boundary
-  Existing Fence
-  Existing Water Development

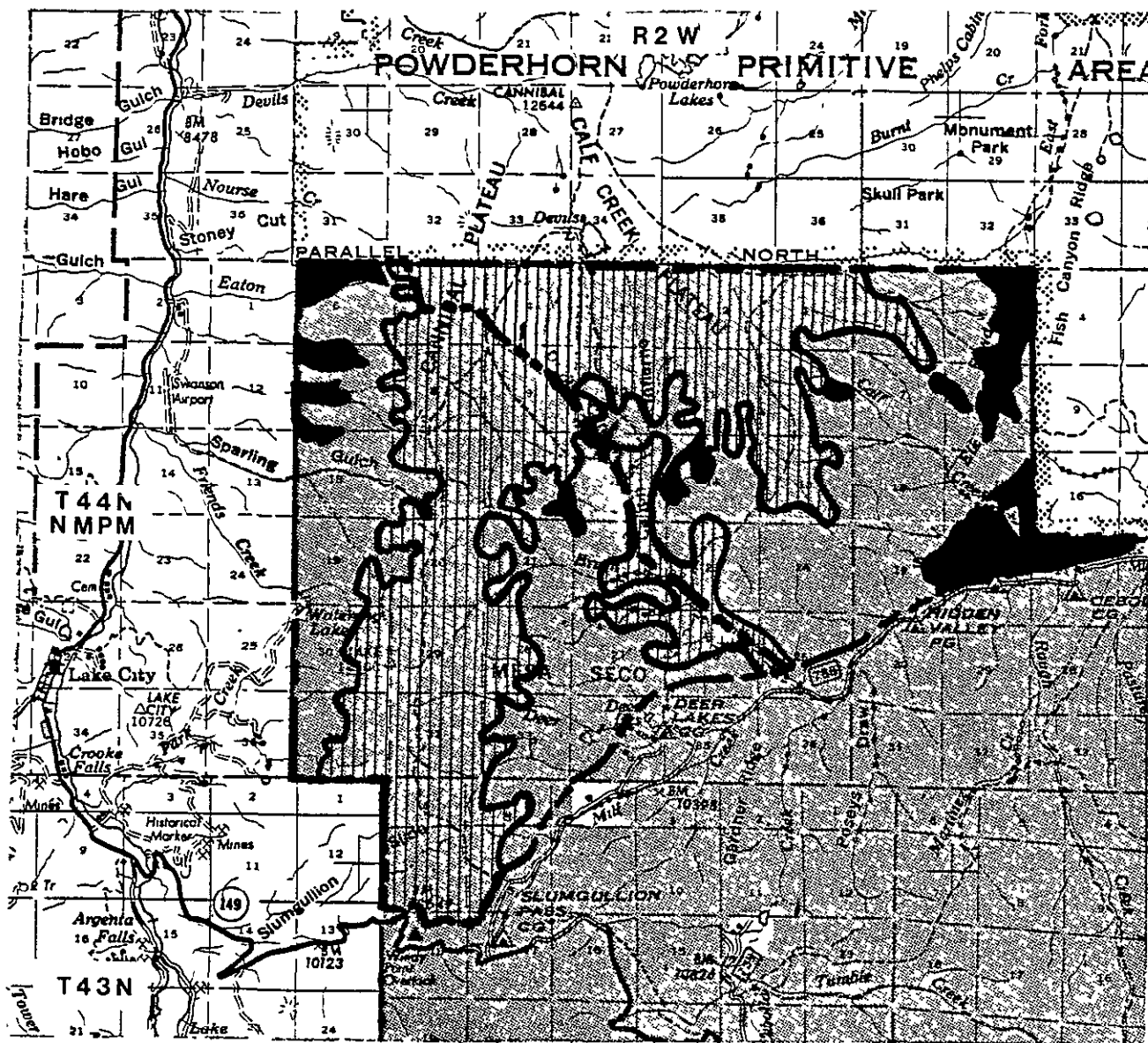
● Proposed Water Development

0 1 2
Miles



FIGURE III-16.

TIMBER
(Cannibal Plateau Further Planning Area)



Further Planning
Area Boundary



Non-Forest



Tentatively Suitable
Timberland



Miles



North



Alpine Vegetation

--Water, Cannibal Plateau - There are no precipitation records for the Further Planning Area. Precipitation is estimated to vary between 17 inches at the lower elevations (9,000 feet) to over 38 inches at 12,500 feet. Snow is the dominant precipitation form.

The Further Planning Area lies at the headwaters of Cebolla Creek. Major drainages include Brush Creek and Calf Creek. A small portion drains into the Lake Fork of the Gunnison River. The area produces an estimated 42,000 acre feet of water annually.

There is no water quality data available for the Further Planning Area.

--Minerals, Cannibal Plateau - Most of the Cannibal Plateau area has a very low potential for locatable minerals and an extremely low potential for oil and gas. There are no patented mining claims and 2 unpatented mining claims in the FPA. No leases or lease applications currently exist.

The southwest portion of the Further Planning Area could contain locatable minerals due to its closeness to the Lake City caldera. The north portion of the Slumgullion Earthflow has geologic evidence for potential mineralization. Adjacent mineralized private property development could extend into the Further Planning Area. The mineralization trend in this area is to the northeast and could extend into the Slumgullion Earthflow. High potential for locatable minerals occurs outside the west border. The area shows extensive hydrothermal alteration and vein mineralization.

The U.S. Geologic Survey is preparing a mineral survey on the Further Planning Area. It is scheduled for publication in the near future. A summary of the U. S. Geologic Survey and Bureau of Mines survey of Powderhorn Primitive Area indicates a low minerals potential for it and adjacent land.

The Slumgullion Earthflow National Natural Landmark is withdrawn from mineral entry.

--Lands, Cannibal Plateau - The FPA contains 31,990 acres of National Forest System land. No private land exists in the Further Planning Area. In addition to the grazing permits two other special use permits exist on the Further Planning Area. One permit is for water storage and diversion at Waterdog Lake. The other permit is for an electronic site on Cannibal Plateau. The electronic site requires year-round maintenance and is accessible by jeep trail in the summer and snowmobile in the winter.

--Protection, Cannibal Plateau - Air quality in the FPA is nearly pristine. High levels of suspended particulates found in the nearby valleys do not extend into Cannibal Plateau due to topography and airflow patterns. There are no existing or planned facilities in the general area that meet the definition of major emitting facilities.

Fire has been a natural ecosystem component in the Further Planning Area, although its role has been minor, particularly in the alpine willow ecosystem. The fire incidence in the Engelmann spruce ecosystem has been low,

and in recent years, natural fires have generally been excluded from the area by intensive control and suppression efforts. Most fires result from lightning strikes and are controlled at less than one acre in size.

Currently, insects and disease are not a problem in the Further Planning Area. Isolated incidences of spruce bark beetle can be found in the forested portions of the Further Planning Area.

--Facilities, Cannibal Plateau - The Further Planning Area has one primitive system road 1.3 miles long. Roads are managed to achieve the maximum public good with the available budget.

The Further Planning Area has six system trails that total 30.2 miles in length. No administrative facilities, bridges or water systems exist in the Further Planning Area.

The Further Planning Area contains one translator tower, three stock ponds and some small scattered dams.

Summary of Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area

The Colorado Wilderness Act requires review and evaluation of both Fossil Ridge and Cannibal Plateau within the Forest planning process.

The Fossil Ridge area will be managed to maintain its existing wilderness character and permit existing uses until Congress acts.

If suitable for inclusion in the National Wilderness Preservation System, Cannibal Plateau will be maintained in its existing wilderness character until Congress acts. The Forest will permit historic grazing use and facilities. If unsuitable for wilderness, the Cannibal Plateau Further Planning Area will be released for non-wilderness management. This is within the framework of the Colorado Wilderness Act.

FISH AND WILDLIFE

Wildlife

Current Use and Management - The Forests' varied habitat supports 314 wildlife and fish species. Of these, 96 species are hunted, fished, or trapped. In 1980, hunting generated 105,200 RVD's and fishing generated 243,200 RVD's. All wildlife uses are expected to increase in the future. Habitat management is a joint effort with the Forest and the Colorado Division of Wildlife (DOW). The Comprehensive Statewide Wildlife Management Plan for National Forest System Lands In Colorado (1980-1984), jointly prepared by the Colorado Division of Wildlife and the Forest Service provides further detail on fish and wildlife population estimates and helps to set priorities for wildlife and fish projects.

The variety of animals is determined by habitat diversity within the Forest. Aspen stands, shrub and grasslands, rock outcrops, cliffs, and riparian areas provide variety to a predominantly coniferous forest cover. Wildlife habitat

diversity is related to vegetation diversity through both its composition and its structural complexity. Both the composition and various structural stages are used to determine the overall wildlife habitat diversity.

Habitat diversity varies from area to area on the Forest. In general, the lodgepole pine component has the poorest diversity with a high percentage being in the mature or overmature classification. Conversely, in some areas the intermediate stages, poles and immature sawtimber, predominate. The reason for these spatial imbalances of age classes is tied to the fire history on the Forest prior to protection and accessibility or inaccessibility of the given areas, with timber harvest having been concentrated in the more accessible areas. Vegetation treatment through commercial timber harvest, prescribed fire and other management activities can increase habitat diversity.

The structural stages in spruce/fir, Douglas-fir, and lodgepole pine types is similar. In lodgepole, Douglas-fir, and spruce/fir, there is generally a lack of young trees, i.e., seedling-sapling.

Of the non-forested habitat types, the alpine is in good condition. Only a few activities, primarily dispersed recreation, affect its wildlife habitat value. The grassland habitat varies in condition with a few areas of livestock-big game competition.

The mountain brush and oakbrush habitat types are of vital significance due to their importance as winter and spring range, principally for deer and elk. A high percentage of this type is overmature and has grown out of reach of wildlife.

Aspen is a major habitat for many wildlife species. Aspen maintenance and regeneration is important for habitat diversity. Much of the aspen on the Forest is overmature and in need of regeneration.

Habitat effectiveness is influenced by the amount of human use and activities that occur within the area. The frequency and time of year of disturbance are important factors.

Terrestrial wildlife habitat can generally be described as either forested or nonforested. Table III-22 displays the percentage breakdown between forested and nonforested habitats by species.

TABLE III-22.

FORESTED AND NONFORESTED HABITATS
(Percent)

Forested	Percent	Nonforested	Percent
Aspen	37	Oakbrush	40
Ponderosa	5	Mixed Browse	16
Spruce-fir	42	Grass	30
Lodgepole Pine	16	Pinyon/Juniper	9
<hr/> TOTAL	<hr/> 100	Meadow	2
		Barren/Rock	1
		Water	2
		<hr/> TOTAL	<hr/> 100

Elk and Deer - Mule deer are found in the forested and open shrubbed areas at both low and high elevations. They also frequent stream bottoms. They are predominantly browsers, but do utilize forbs and grasses at certain times of the year. Elk use semi-open forests, parks, meadows and tundra mountain situations. Since they gather in large herds and have a comparatively high reproduction potential for a large game animal; the grasses, forbs and browse species on which they feed must be present in comparatively large quantities.

The limiting factor for elk and deer is winter range. Only a small portion of the total winter range for these species is located on National Forest System land. Critical winter range is at lower elevations on BLM and private land. The Forest is coordinating with the State and other Federal agencies and private landowners to agree upon manageable herd sizes in relation to the carrying capacity of winter range. Cooperative vegetation treatment activities with the DOW in habitat improvement include prescribed burning in oak types and aspen regeneration. Vegetation treatment of a winter range's climax successional stage improves diversity and suitability of the range. Approximately 242,000 acres of critical winter range is on the Forest. There is sufficient summer range on the Forest to greatly increase deer and elk numbers. The Forest's current winter range carrying capacity is 82,700 elk and deer annually. These numbers, agreed upon with the DOW, include 21,450 elk and 61,240 deer.

There is summer range capacity to increase big game numbers. The Forest has the highest deer and elk populations of any National Forest in the United States. These big game species are considered on any action which affects their habitat on National Forest System land. The Forest does not intend to increase summer range for increased capacity. Winter range is the limiting factor. The Forest can increase summer or transitory range quality through vegetation treatment activities like timber harvest.

Lodgepole stands where no treatment occurs have low diversity levels. Thick stands of even-age poles block big game movement and greatly limit understory vegetation. However, small clearcuts north of Taylor River have opened a large expanse of lodge pine infested with mistletoe. These clearcuts created small parks with native forbs and grasses. Elk use has greatly increased by providing feeding habitat adjacent to cover. Many roads leading to the openings have been blocked, ensuring big game seclusion. Human pressure in the alpine areas move elk out as backpackers arrive in the summer. Although summer range is available, it is not being used in the alpine due to backpacker use.

Creating openings through clearcuts in lodgepole pine has been done through timber harvest when a product is removed. This same process would have taken the entire Forest wildlife budget to accomplish a portion of the beneficial effects accomplished through timber management. When big game animals come off the Forest in good shape, they have fat reserves to help them through difficult periods in the winter range. Studies (Journal of Wildlife Management) have shown better conception when deer and elk are in good condition with a resulting good fawn and calf crop.

Deer and elk hunting on the Forest results in substantial contributions to the State and local economies. The number of hunting permits issued each year is controlled by the State. According to the State Comprehensive Wildlife Plan, approximately 24 percent of the elk herd is harvested annually. Harvest figures for deer are not available for the Forest.

Black Bear - Black Bear ranks third among big game species behind mule deer and elk in sport hunting. Females have their first young at age four and only have cubs every other year. It is the only big game animal which hibernates. Black Bear is hunted from the time it leaves hibernation, usually in mid-April to mid-May thru June. It is also hunted concurrently with deer and elk until it enters hibernation in mid-October thru November. Mast in the oak brush type is important to build fat reserves for winter. Research is being done on the Forest by the Colorado DOW to obtain basic data on this least understood big game species in Colorado.

Bighorn Sheep - Rocky Mountain bighorn sheep are present on six areas of the Forest. Summer ranges at high elevations are mostly within wilderness areas. The majority of winter range occurs on BLM land. The quantity and quality of summer range and migration corridors is currently not optimal for bighorn sheep. Cooperation with the DOW is continuing in lungworm treatment through baiting and medication.

Threatened and Endangered Species - The Endangered Species Act of 1973 requires all Federal departments and agencies to conserve threatened and endangered species. Table III-23 displays the federally or state-designated, threatened or endangered, and plant or animal species that may occur on the Forest. The Forest has identified hack sites for the peregrine falcon.

TABLE III-23.

THREATENED OR ENDANGERED
PLANT OR WILDLIFE SPECIES

Common Name	Scientific Name
American Peregrine Falcon	<u>Falco peregrinus anatum</u>
Spineless Hedgehog Cactus	<u>Echinocereus triglochidiatus</u> <u>var. inermis</u>
Whooping Crane**	<u>Grus americana</u>
Greater Sandhill Crane**	<u>Grus canadensis tabida</u>
Wolverine***	<u>Gulo gulo</u>
Bald Eagle	<u>Haliaeetus leucocephalus</u> <u>alascanus</u>
Lynx***	<u>Lynx canadensis</u>
Colorado River Cutthroat*	<u>Salmo clarki pleuriticus</u>

* Listed only as Colorado Threatened and Endangered Species.

** Migrant occurrence.

***Doubtful existence on the Forest.

Forest Service botanists have diligently attempted to identify species and locations of plants which may have endangered, threatened, or sensitive status. In addition, these botanists have been involved with recommendations and information pertinent to the U.S. Fish and Wildlife Service (US F&WS) listings. On December 15, 1980, the US F&WS published in the Federal Register a list of those plant species native to the United States that were being reviewed as endangered or threatened under the Endangered Species Act of 1973, as amended. Forest personnel have inventoried 1 plant species listed in this publication as Category 1. Five plant species in Category 2 possibly occur although not all have been located on the ground. Plants thus inventoried will be managed to permit the US F&WS to make accurate evaluations as to their status.

The sensitive species, Uncompahgre Fritillary Butterfly (Boloria acronema) is under consideration for Federal designation and exists on the Forest. Its habitat is being studied by the Colorado Natural Areas Program. The species Braya humilus spp. Ventosa (no common name) is in need of special management according to Regional Direction.

During informal consultation, the U.S. Fish and Wildlife Service indicated the Forest Plan analysis should consider three additional threatened and endangered fish species. These species are: Colorado Squawfish, Ptychochellus lucius; Humpback Chub, Gila cypha; and Razorback Sucker, Xyrauchen texanus.

None of the fish have been found on the Forest and the identified occupied and historical ranges are far removed from the Forest.*

The three dams in the Curecanti project and the Collbran project are the main factors effecting water temperature which seems to be essential to spawning.

The three fish species are not affected by National Forest System management.

Management Indicator Species - Habitat requirements vary according to early and late forest succession stages. Early forest succession refers to plant communities that develop after harvest or removal of vegetation; for example, grass, forbs, or tree seedlings. Late forest succession refers to a stage in which trees are mature or overmature.

Certain wildlife species found in specific vegetation types have been selected to represent the habitat needs of a larger group of species requiring similar habitats. These are called management indicator species. The species selected for late forest or vegetation succession represent a smaller number of wildlife species with highly specialized requirements. Early succession species represent a large number of wildlife species which are more adaptable to early secondary vegetation. Table III-24 displays the indicator species and their habitat association.

Source: *Essential Habitat for Threatened and Endangered Species; David Langlois, 1978.

TABLE III-24.

ASSOCIATIONS OF MANAGEMENT INDICATOR SPECIES

Vegetative Type	Early Succession	Ab*	Late Succession	Ab*
Old Growth Spruce-fir	Elk	F	Pine Martin	U
Mature Spruce and Douglas-fir	Elk	F	Red Crossbill	A
Mature Lodgepole Pine	Elk	F	Hairy Woodpecker	F
Mature Aspen	Elk	C	Goshawk	F
Mature Ponderosa Pine	Mule Deer	C	Abert Squirrel	F
Mature Mountain Shrub	Elk	F	Lewis' Woodpecker	C
Late Succession Sagebrush	Mule Deer	A	Sage Grouse	F
Mature Pinyon- Juniper	Mule Deer	A	Pinyon Jay	C

* Abundance Code

A = Abundant: Observations of 25 per day usual in suitable habitat.

C = Common: Observations of 10 per day.

F = Fairly common: One or more observed per day.

U = Undetermined: Not enough information to classify.

The Forest planning process identified management indicator species. They represent the effects and influences of land uses on wildlife and fish. Table III-25 displays the Forest's management indicator species. Criteria used to select these species were:

- There were issues or concerns about the wildlife species and/or its habitat.
- The species is endangered or threatened, either nationally or statewide.
- The species has special habitat needs that may be influenced significantly by management practices resulting from land use allocation.

--The species are economically important and are commonly hunted, fished, or trapped.

--The species represents the habitat requirements of other species or groups of species.

TABLE III-25.

SPECIES AND THEIR SIGNIFICANCE TO
MANAGEMENT AS INDICATORS

Species	Habitat Indicator Significance
Mule Deer	Economically Important
Elk	Economically Important
Bighorn Sheep	Economically Important
Rainbow Trout	Economically Important
Black Bear	Economically Important
Abert Squirrel	Special Habitat Needs
Pine Martin	Special Habitat Needs
Hairy Woodpecker	Represents Requirements for Other Species
Red Crossbill	Represents Requirements for Other Species
Goshawk	Represents Requirements for Other Species
Lewis' Woodpecker	Represents Requirements for Other Species
Sage Grouse	Represents Requirements for Other Species
Pinyon-Jay	Represents Requirements for Other Species
Peregrine Falcon	Threatened and Endangered
Bald Eagle	Threatened and Endangered
Colorado Cutthroat Trout	Threatened and Endangered

The National Audubon Society and several individuals felt the number of management indicator species listed in the Draft EIS was too limited and suggested additions. Although some of the species recommended are reasonable candidates for indicator species, those that are being used will adequately represent the range of wildlife species found on the Forest. Please refer to Comments 3 and 9, under Planning Question 5 in Chapter VI, for further discussion.

Demand Trends - Demand for winter range will continue to be an important issue. As more critical big game winter range is lost outside the Forest boundary and the demand for deer and elk hunting increases, the Forest will be called upon to improve winter range quality and quantity. The quantity, quality, and location of habitat for bighorn sheep will need identified. Big game herd size is constrained, in part, by National Forest System winter range carrying capacity. The Forest will continue to cooperate with the DOW and will provide adequate wildlife habitat.

The Forest does not foresee a significant increase in big game populations due to the limiting factor which is winter range. Habitat improvement through vegetation treatment on National Forest will partially off-set habitat loss on private land due to changing land use such as subdivision, fencing orchards and mining exploration and development. These occurring and potential impacts on private land to deer and elk are real and are not controllable by land management agencies or the Colorado DOW.

As more human pressure is placed on National Forest summer range, the Forest will be looking at methods to improve it for wildlife. The largest number of elk harvested in the early big game season in 1982 occurred adjacent to some of the clearcuts in the Pieplant area of the Gunnison National Forest. Estimated current and projected wildlife populations of other species is located in the Statewide Comprehensive Plan. The Forest views big game trends to be slightly upward or close to current populations.

A wildlife discussion of Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area is displayed in the Wilderness section of this chapter.

Fish

Current Use and Management - Riparian habitat is especially important for wildlife and fish. Problems exist in the riparian zone with livestock grazing and off-road vehicle use. There are currently 1,200 miles of streams inventoried as fisheries on the Forest.

A recovery program for the cutthroat trout has been coordinated with DOW. A habitat inventory is underway. Native stocking occurs on 18% of the lakes on the Forest. For all other species, the inventory of areas for designation of critical habitat is continuing.

Emphasis will be continued on improving productivity; identifying areas of unsuccessful stocking; reevaluating an areas need for restocking; and protecting riparian habitat.

Demand Trends - Although a few high quality rivers and streams have self-sustaining brook and brown trout populations, most fisheries are heavily dependent on the State's fish stocking program. Federal fish hatcheries will be closing soon, including the National Hatchery at Lazear which provides trout for the Curecanti Project, three large impoundments on the Gunnison River. The Forest hopes the State hatcheries will try to fill the gap in reservoir stocking since reservoirs have heavier use by fishermen and are a greater attraction on a volume basis than streams. National Forest stocking

will be depleted as a result of the declining hatchery base. As fishing pressure increases, specific fish habitats may become over used. The Forest will need to provide fish habitat in highly productive ponds and lakes. The Forest will continue to fulfill its responsibilities under the Endangered Species Act. As threatened and endangered habitat is identified the habitat will be protected. The Forest will continue to cooperate with the DOW and provide adequate fish habitat. Demand trends for dispersed recreation are displayed in the recreation section in this chapter.

A fisheries discussion of Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area is displayed in the Wilderness section of this chapter.

RANGE

The Forest currently has 1,295,775 acres classified suitable and available rangeland. These areas support about 320,000 AUM's annually. About 50,000 acres have been identified to be in low ecological condition, producing less than 40% of its potential. Within classified wilderness areas, 23,000 AUM's are permitted on approximately 115,000 acres of suitable range. Grazing occurs in some municipal watersheds. Use is managed to assure water quality is maintained to acceptable standards.

Ecological range condition is the degree of similarity between the present community and the potential natural community for a site. Range condition considers only secondary succession. On many ranges, especially forested ranges, early and mid-seral stages of succession produce the largest amount and highest quality forage for livestock and big game.

Approximately 95 percent of the suitable rangelands on the three Forests included are in satisfactory condition. Through implementation of intensive grazing systems, installation of improvements, and changes in numbers and seasons over the past 30 years, nearly all rangelands are in a stable or upward trend. Management implemented through individual Allotment Management Plans could bring all rangelands to satisfactory condition by 1990.

The greatest potential for increasing forage production is the installation of new structural range improvements so that wild animals and livestock can use forage that is already present but not easily used. Vegetation treatment to change composition through nonstructural range improvements, also has potential for increasing forage production, but only about forty percent of the total potential than implementing structural improvements has.

A range discussion of Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area is displayed in the Wilderness section of this chapter.

Current Use and Management - There are 238 livestock grazing allotments on the Forest; 173 are cattle and horse allotments, 61 are sheep and goat allotments, and 4 are dual use. In 1982, 20 grazing allotments were classified vacant and are being evaluated as to future management. The overall trend of range condition is generally improving. All allotments are being managed under approved allotment management plans. Most existing management plans schedule use of intensive grazing systems.

Approximately 65,000 cattle, 5,300 horses and 61,000 sheep are annually permitted on the Forest under term grazing permits. The majority of the cattle are permitted on the Forest from mid May to mid October. The majority of sheep are permitted from mid July to mid September. Current use schedules 37,000 sheep AUM's, 280,000 cattle AUM's, and 3,000 horse AUM's.

Livestock grazing on National Forest System land is a vital part of the year-round operation of many area ranches. The Forest provides high altitude summer pasture that is important for the maintenance of mother cows and ewes, and for the quality of growth for calves, lambs, and yearling livestock. Most ranchers do not own sufficient rangeland for year-long livestock needs.

Private and Forest ranges are complimented in many instances by use on BLM rangelands during spring and fall. The Forest and BLM grazing permits are coordinated and written to provide for uniform flow of livestock from private land to spring BLM ranges, onto the Forest for summer and then reverse the cycle to private ranges for winter. Cooperative agreements have been developed between the two agencies to facilitate management of public and private rangeland used by the same permittees. Exchanges of administrative management of the public land range allotments are being initiated where they are beneficial. Currently the BLM provides for grazing of approximately 235,000 AUM's annually adjacent to the Forest. Through a cooperative agreement with the Soil Conservation Service, increased emphasis will be placed on coordination of resource planning in cooperation with the private landowner.

The Forest also cooperates with the DOW in joint financing of rangeland improvement projects which benefit both wildlife habitat and livestock grazing. These projects include improvement and construction of watering facilities and manipulation of brushland sites to improve diversity and forage production. Projects are being coordinated with other Forests, BLM, State, and private ownership where feasible to maximize benefits and reduce costs.

Demand Trends - Future demand for grazing is expected to remain high and will exceed the available supply. Stocking on the Forest is within the estimated carrying capacity. Opportunities to increase grazing exist through vegetation treatment activities (forage improvement projects) and range structural improvements. Silvicultural activities, oakbrush management, and sagebrush control will benefit the range resource. Management practices will be initiated in allotments having range in low ecological condition.

Dependency on National Forest System land will increase as more private land is developed. Higher costs associated with feed lot operations will add to the dependency.

The Forest could sell all the AUM's it could provide. This would require additional investments to manage the forage resource. Table III-26 displays the livestock carrying capacity over the planning horizon.

TABLE III-26.

LIVESTOCK CARRYING CAPACITY

	Time Period					
	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
AUM's	497.2	497.2	501.7	503.1	501.2	496.2

TIMBER

Timber management on the Forest has not been a cost-effective program in recent years when only considering the direct costs and revenues of selling trees. However, when all the other associated resource benefits are considered, a timber management program becomes a realistic and cost-effective management tool. The other resource objectives provide the impetus for a coordinated timber management program and in so doing improve the effectiveness of their own programs. Without a timber management program, many other resource management programs would cost a great deal more or could not be accomplished at all. Chapter IV further discusses contributions timber management makes to other resources. In a sense, wood products are both an objective and a by-product of multiple-use management. Some examples of this concept follow:

- Wildlife and visual management goals depend on maintaining the presence of aspen species near present levels. Accomplishment of this goal requires that older stands be regenerated to a new stand of young trees before the aspen is replaced by other vegetation types through natural succession. Regeneration of the older aspen can be accomplished by burning or cutting down the existing trees. This permits new trees to develop from the root system of the burned or cut trees. Another management option is to designate the stands to be regenerated and offer the trees for public sale for utilization as firewood or sawlogs. Selling the trees can accomplish the same goal at a reduced or equivalent cost with the further benefit of returns to the U.S. Treasury.
- The skewed age class distribution towards an older, mature to over-mature forest makes the trees on the forest highly susceptible to insect and disease infestations. Direct epidemic control is an expensive, short-term solution. Silvicultural treatments through commercial timber sales offer an opportunity to provide long-term protection at a reduced cost and realize the additional benefits of the timber harvested.
- An additional benefit of changing the Forest's age class distribution from its present mature condition is the increase of early successional structural stages, an important habitat needed for many wildlife species. Since the advent of modern fire control, the most effective natural creator

of early structural stages no longer provides an ideal structural balance. The balance of structural stages can be improved artificially by regenerating mature forests. Such changes in age classes are most efficiently accomplished with a commercial timber sale.

--The importance of water in the arid west is receiving increasing attention as demand increases substantially and the available supply remains relatively constant. It is well documented that vegetation treatment can increase water yields.* The opportunity for the largest increases occur in the subalpine forests from small clearcuts. The timber harvested from such openings can improve the cost-effectiveness of creating the openings.

--The aesthetic beauty of the Forest is important to thousands of people who visit the Forest annually. Studies** of visual perception indicate that most people enjoy the appearance of a younger, vigorous, healthy forest over that of an over-mature forest with dead and dying trees evident to the viewer. A coordinated visual management/vegetation program can significantly enhance visual quality in scenic areas as well as provide wood products.

--Downhill skiing is a major recreational activity on the Forest. Forest vegetation is essential to a quality skiing experience because it improves snow retention and snow quality; it provides better depth perception; and it creates a pleasurable outdoor experience. An over-mature, decadent forest which is highly susceptible to devastating wildfire and insect epidemic is not a desirable condition. A younger, vigorous forest with a more balanced age class distribution provides the desired benefits at much less risk. A portion of the required vegetation treatment costs may be recovered by selling the resultant wood products.

--Dispersed motorized recreation is a very popular activity on many of the Forest's roads. As more people engage in this activity, the quality of the experience decreases. A coordinated timber management and travel management program offers the opportunity to enhance dispersed motorized recreation.

--A related resource management need is improved access for public firewood gathering. Much of the firewood along existing roads has been removed through public firewood programs. Improved Forest access as a result of resource management will substantially increase the available public firewood supply.

The timber resources are currently managed under two timber management plans. The Grand Mesa and Uncompahgre Timber Management Plan was approved on August 18, 1975. The Gunnison Timber Management Plan was approved November 13, 1975. Table III-27 displays the potential yield from the current timber management plans.

Source: *"Watershed Management in the Rocky Mountain Subalpine Zone", Charles F. Leaf, USDA Forest Service, February 1975.

**In proceedings, 1979 Convention, Society of American Foresters, October 14-17, 1979, Boston, Massachusetts, pp. 95-102.

TABLE III-27.

CURRENT POTENTIAL YIELD
(Average Annual)

Forest	Million Board Feet
Grand Mesa, Uncompahgre	16.83
Gunnison	18.11
TOTAL	34.94*

*Standard and Special Components Only.

Current Use and Management - The combined allowable sale quantity equals 35 million board feet (MMBF) annually. Timber harvesting is conducted on a regulated, non-declining basis. The average annual amount cut cannot exceed the long-term capability of the Forest to produce wood fiber. The current average annual programmed sales offered equals 28.8 MMBF.

Vegetation treatment through timber harvests are designed to achieve multiple-use objectives. These include insect and disease control measures, wildlife habitat improvement, range improvement, visual quality improvement, and water yield as well as wood fibre production. Approximately 500 acres are currently harvested annually through clearcut methods. The balance (4300 acres) is harvested through shelterwood harvest methods.

Timber harvest activities currently are conducted on land identified capable, available, and tentatively suitable. Approximately 37% of the Forest, 1,089,208 acres are classified tentatively suitable for timber production. The Forest is conducting inventories to identify the growth potential for capable, available, and suitable land. This inventory is scheduled for completion in 1985.

Table III-28 displays local mill locations and the percent of the Forest's timber they purchased between 1978 and 1980. The current mill capacity in the Forest's marketing area is approximately 42.5 MMBF.

TABLE III-28.

TIMBER MILL LOCATIONS

Mill Location	Percent of Timber Purchased Annually
Creede	2%
Crested Butte	1%
Cimarron	1%
Delta	8%
Montrose	63%
Norwood	2%
Paonia Area	3%
South Fork	20%

Five thousand three hundred acres were planted in fiscal years 1980 and 1981. Most of this acreage resulted from an accumulation of harvested areas not reforested. By 1984, this accumulation will be eliminated. During the period 1961-1981; 24,406 acres were planted on the Forest. Survival has averaged 40% to 60%.

Personal, free-use firewood cutting has been used to eliminate dead and down material left from past timber sales. Demand for free-use firewood is estimated at 9 MMBF per year and rising. Firewood is also available from green tree thinning, oakbrush management, and aspen stand treatment for wildlife habitat improvement.

Currently timber supply exceeds demand. This is due to the cyclic nature of lumber markets for softwood lumber. The demand for products such as house logs, poles, mine props, and fuelwood has increased in recent years.

The National Audubon Society, in response to the Draft EIS, feels that, "The standard for determining land 'capable' for timber harvest should be 50 cubic feet/acre/year, not 20."

The 1979 NFMA Regulation, under which the analysis is conducted, required that land suitable for timber production have a biological growth potential equal to or exceeding the minimum standard defined in the Regional Plan. The 20 cu.ft./ acre/year criteria was established in the Draft Regional Plan for this Region. This tentative direction was used in preliminary analysis for the Forest Plan to avoid unacceptable delays. The 20 cu.ft./ acre/year is only one of a range of biologic, environmental, and economic factors used to determine suitability for timber production. In fact, much of the land capable of producing 20 cu.ft./acre/year will not be managed for timber production. The 1982 revised NFMA regulations dropped the 20 cubic feet/acre/year growth standard. As now stated, the economic suitability test is defined in 36 CFR 219.14(c) and (d) and depends upon the objectives of the particular alternative that is selected and approved as the preferred. This amendment will be incorporated in the next scheduled revision of the forest Plan as required by 36 CFR 219.29(b)(1). Table III-29 and Figure III-17 display land tentatively suitable for timber production.

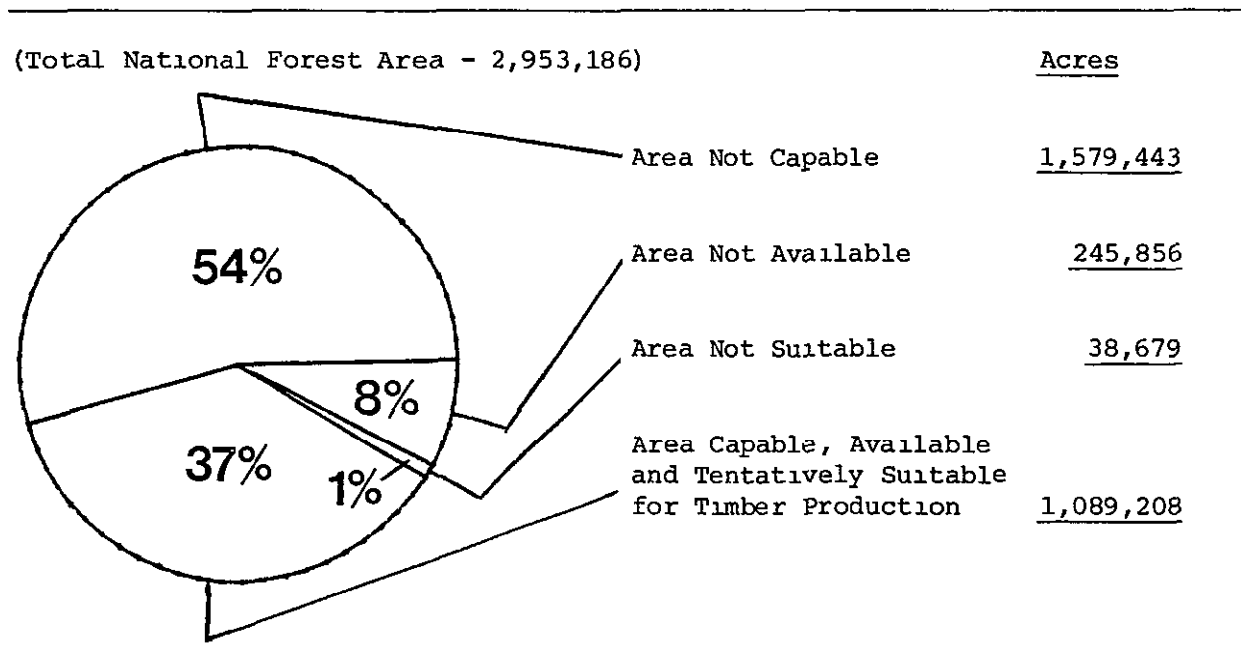
TABLE III-29.

LAND CAPABLE, AVAILABLE, AND TENTATIVELY SUITABLE FOR TIMBER PRODUCTION

Criterion	Classification	Acres
	Net National Forest Ownership	2,953,186
Minimum Biological Growth Standard (20 CF/Ac/Yr)	Water	15,199
	Non-Forest Land	715,907
	Forest Land	
	A. Not Capable (Less than 20 CF/Ac/Yr)	848,337
Legislatively or Administratively Withdrawn	B. Capable but not Available	
	1. Reserved.	
	Wilderness	213,249
	Research Areas	426
	2. Deferred.	
	Wilderness Study Areas designated by Congress.	32,181
	designated by Administration.	0
	C. Capable and Available but not Suitable	
Lack of Technology	1. Technologically Not Suitable.	
	Irreversible Soil or Watershed Damage	37,381
Administrative Allocation	2. Administratively Not Suitable.	
	Experimental Forest & Administrative Sites	1,298
	D. Capable, Available and Tentatively Suitable Land	1,089,208

FIGURE III-17.

LAND TENTATIVELY SUITABLE FOR TIMBER PRODUCTION



The Forest contains 480,000 acres of aspen classified tentatively suitable forest land with an estimated sustained yield of 25 MMBF. A regular market for aspen products is unavailable at this time and consequently cannot be managed at its full potential. Aspen stands will convert to other forest types through natural succession if not regenerated. The various forms of vegetation treatment will offer the opportunity to reverse this trend in natural succession and be designed to achieve multiple use objectives. Utilization of the timber resource is also hampered by the lack of a large milling facility in the Gunnison area.

The timber resource is comprised of five predominant forest types. They are: Engelmann spruce-subalpine fir, ponderosa pine, lodgepole pine, Douglas-fir, and aspen. Blue spruce, bristlecone pine, and limber pine occur either as mixtures with or on the fringes of the predominant types in certain situations.

The increasing demands for multiple-use of National Forests, a reduced land base suitable for growing trees and increasing costs of producing forest products suggests the need to produce more high quality fiber per acre per year on a sound economic basis. One method of doing this is by utilizing sound genetic principles in all vegetation treatment activities. Genetic principles are incorporated into all silvicultural prescriptions to insure naturally regenerated trees are of the best possible quality. A limited tree improvement program has also been initiated on the Forest. This is expected to be an ongoing program to produce superior quality trees at relatively low cost.

Any vegetation treatment that improves the composition, condition, or growth increment of a forest stand may be considered timber stand improvement. In the context used here, timber stand improvement refers to treatments made on a non-commercial basis to improve present and future resource values. Resources that benefit from the Forest's timber stand improvement program include wildlife, visual management, insects and disease prevention, and timber management. Timber stand improvement is directed at pre-commercial thinning in regenerated stands, release and weeding in residual stands following over-wood removal, and pre-commercial thinning of overstocked natural stands. Dwarf mistletoe control is another timber stand improvement that has been receiving more attention in recent years. Stagnated lodgepole pine stands which are less than merchantable size could provide firewood opportunities for the Forest. These stands are typically rather old with very poor crown development and poor vigor. The ability of these stands to respond to thinning is very low.

In 1980, timber from State and private land supplied an estimated 2.5 MMBF to the local area. On State and private land there are about 93,261 acres of commercial sawtimber with a volume of over 750 MMBF. The potential yield is estimated at 3 MMBF annually.

National Resource land administered by the BLM comprises about 42,500 acres of commercial forest land with an estimated volume of 424 MMBF. The potential yield is estimated at 3.1 MMBF annually.

Efforts have been undertaken to coordinate timber resource activities with State and other Federal agencies to better meet public demand for fuelwood supplies, both for individual and commercial uses. Areas designated for free-use firewood gathering are being coordinated with the BLM and a joint news release issued to the public. This same action is being taken for Christmas tree sales to individuals.

The small sales program emphasizes wood product availability to local farms and ranches. This program is also beneficial by giving opportunity to the small family-owned wood producing business to enter and expand operations on Federal, State, and private commercial forest land.

A timber economic efficiency analysis was performed in accordance with NFMA regulations. The Forest's linear programming model was used to accomplish the analysis. Appendix E displays timber economic efficiency analysis.

The analysis indicates that the economically efficient timber stands are those classified as spruce-fir, sawtimber size (greater than nine inches diameter at breast height), on less than 40% slopes, in fully roaded (3.5 miles/square mile) areas. The harvest method selected is the 3-step shelterwood system.

Demand Trends - Demand for firewood will increase sharply. Demand for sawtimber is currently below supply. The Forest is in a market position similar to that of an individual producer in agriculture. Even a large change in timber output would not affect a change in market price. The Forest is currently facing a horizontal demand curve at market price levels. Demand for timber is estimated at 30-45 MMBF annually over the 50-year planning horizon. Table III-30 displays the timber demand on the Forest. There is a potential increase in demand for timber if Continental Lumber Company makes actual investment commitments at specific locations if the Forest's marketing area.

TABLE III-30.

TIMBER DEMAND*

	Time Period					
	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Million Board Feet Annually	40	40	40	40	40	45

*Demand estimates based on timber demand trends displayed in Final Regional Guide for timber 7 inches in diameter and greater from suitable timberland.

A timber discussion of Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area is displayed in the Wilderness section of this chapter.

WATER

The water yield from the Forest comprises an estimated 40% of the Colorado River flow at the Colorado and Utah border. Total mean annual water production is approximately 2.87 million acre feet. This is an estimated increase of 18,600 acre-feet per year (.65%) over the baseline water yield. (Baseline water yield is the runoff expected if all watersheds were in their natural pristine condition.) Past vegetation treatment through timber harvest, wildfire, prescribed burning, wildlife habitat improvement, and road construction has contributed to the increased water production.

The majority of runoff from the Forest results from snowmelt during April through July. It is estimated that over 75 percent of total annual runoff occurs during this period. The timing of peak flows varies considerably by elevation. At high elevations, where most Forest watersheds occur, streamflows are generally greatest from June through early July. At lower elevations, peak flows can occur as early as mid-April.

Current Use and Management - Water from the Forest is important for a variety of on-site and downstream uses. These include municipal, industrial, agriculture; instream flows for fisheries, recreation, wildlife; and for meeting delivery obligations to Mexico set by the United States - Mexico Water Treaty of 1944.

The maximum water yield increase potential by the year 2030 is estimated at 125,000 acre feet per year over current levels. Most of this potential is a result of vegetation treatment and snowpack management. Snowpack management in nonforested areas, such as snowfencing on alpine ridges, provides potential for increasing water yields. The estimate of potential increases from vegetation treatment was based on the following assumptions:

--All tentatively suitable forest land with slopes less than 40% is assumed capable of vegetation treatment for water yield increases.

--Approximately one-third of the tentatively suitable forest land with slopes greater than 40% is assumed capable of vegetation treatment for water yield increases.

--Approximately one-third of non-forest land with slopes less than 40% is assumed capable of snowpack management for water yield increases.

--Wilderness acreage is excluded.

The water yield increase potential for the Forest through timber harvest is estimated at 67,000 acre-feet per year over current levels. This estimate is based upon the following assumptions:

--Potential for increasing water yield is limited to forest land with stocking levels sufficient to be capable of commercial timber production in 50 years. Non-forest land is eliminated from this calculation.

--Potential for increasing water yield is limited to aspen, spruce-fir and lodgepole pine. Clearcuts for water yield increase are incompatible with the silvicultural requirements of ponderosa pine. The extent of other forest types on the Forest is negligible.

--Potential for increasing water yield through timber harvest is limited to slopes less than 40% by economic and environmental considerations.

--Wilderness acreage is excluded.

In the past vegetation treatment has given little consideration to cumulative impacts on the water resource. Water yield increases have been incidental to rather than an objective of the action. If that trend were to continue, total water yield increase would only be 182,600 acre-feet over current levels, or an average of 3,650 acre-feet per year. Also in the past, analysis of water quality impacts has been on a project by project basis. Cumulative impacts of several projects have received little consideration.

An estimated 95% of the water flowing through the Forest meets quality standards. Water not meeting standards is affected by toxic metallic pollutants from past mining activity, sediment from road construction, grazing in riparian areas, and timber harvest.

Water quality goals can be met by:

--Treating the watershed restoration needs as funds become available.

--Increasing attention to riparian areas in range management plans.

--Coordination with state and local agencies.

--Planning silvicultural activities, road construction, and other management activity on a watershed basis to prevent excessive sediment production.

Water quality sampling continues to monitor the success of the measures described above. Sampling is also conducted to define the nature and extent of other potential problems that may occur with increasing development, such as those associated with acid rain precipitation.

Numerous water collection, storage, and distribution systems exist within the Forest boundary. Requests for further water development will continue to be processed according to State water law and Forest's permitting process.

Demand Trends - The importance of the water resource will increase greatly in future years. Runoff from this area is critical to the water supply of the southwest United States where much of the water generated on the Forest is used. There is an increasing demand for water on the western slope. New industries also require additional water.

The question of how much additional water could be produced on the Forest depends on the demand for, value of, and the cost of providing the additional water. Other resource values and public desires must be considered. Though agriculture (with a low marginal value for water) currently uses the majority of water, shifting economic structures may change the demand for and value of additional water. Economic principles do not operate freely to determine the price of water, especially "new" water. This is due to the complicated nature of the laws and customs governing water use and distribution in the Colorado River Basin. The revenue generated for increased water is not an accurate gauge of its value to society. No determination can be made with available information as to a desirable level of water augmentation on the Forest. However, by modifying existing vegetation treatment practices at very low cost, the opportunity exists to more than double the rate of water yield increases. This can be achieved while maintaining the minimum standards and guidelines for protecting and managing all other resources.

A water discussion of Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area is displayed in the Wilderness section of this chapter.

MINERALS AND GEOLOGY

Satisfying demand for locatable minerals is the responsibility of the mining industry. Public domain land is available for mineral exploration and development under all applicable laws and regulations. For leasable minerals the Department of Interior leases tracts for development by the mining industry. Saleable minerals are the only type of mineral commodity for which the Forest can directly affect the supply by selling materials to individuals and private industry.

Limits on the time available for staking and validating claims and obtaining leases in designated wilderness are established in the 1964 Wilderness Act. The Act provides that the United States mining and mineral leasing laws apply within wilderness areas until midnight December 31, 1983. Effective January 1, 1984, wilderness areas are withdrawn from mineral entry. This withdrawal is subject to valid claims and existing leases. Valid claims and existing leases on the withdrawal date are still available for further exploration and development. Claims that lack discovery by the above date will be void.

After midnight December 31, 1983, new leases will not be available in wilderness areas. Leases obtained within wilderness or wilderness study areas prior to the above date will be subject to lease stipulations designed to protect the wilderness environment. These are included in the appendices accompanying the Plan. In the case of coal leasing, wilderness designation of the study area will preclude coal leasing. This is subject to existing rights. Under non-wilderness designation, the question of suitability or unsuitability for coal leasing will be determined by applying BLM's unsuitability criteria.

Oil and gas deposits within no surface occupancy areas could be recovered through directional drilling or other techniques which will not disturb surface resource values. Where timber management direction is applied on no lease areas, lease will be recommended under the limited surface use stipulation.

USDI, Bureau of Land Management, is the responsible agency for the Environmental Analysis of proposed operations on mineral leases. Cooperation with the BLM insures that data developed in the Forest planning process is available for their analysis.

Process for Handling Mineral Activities

Forest Service policy toward mineral activities on National Forest System lands is guided by statutes and expressed in regulation; in statements of the President, the Secretary of Agriculture and the Chief of the Forest Service; and in the Forest Service Manual.

Minerals are fundamental to the Nation's well-being. The National Forest System, by coincidence of geology and geography, is a principal storehouse of mineral and energy resources. The search for and production of minerals and energy resources are statutorily authorized uses of the National Forest System, except for those lands formally withdrawn from mineral activities by Act of Congress or by Executive authority. Mineral activities on National Forest System lands are encouraged in accordance with the National Mining and Mineral Policy Act, the Acts governing mineral disposals from National Forest System lands and the various applicable Federal and State statutes governing protection of the environment, including air and water quality.

The Forest Service objective is to manage minerals related activities in a timely manner, consistent with multiple-use management principles, and to integrate the exploration, development, and production of mineral and energy resources with the use, conservation, and protection of other resources.

Statutory and regulatory direction separate mineral resources in lands owned by the United States into three categories: locatable, leasable, and salable.

Locatable Minerals

Locatable minerals are those valuable deposits subject to exploration and development under the U.S. General Mining Law of 1872 and its amendments. Commonly, locatables are referred to as "hardrock" minerals. Examples include, but are not limited to, deposits of iron, gold, silver, lead, zinc, copper, and molybdenum. Citizens, and those who have declared their intent to become citizens have the statutory right to explore for, claim, and mine mineral deposits in Federally-owned lands subject to the U. S. Mining Laws, including those of the National Forest System. Through a memorandum of understanding with the Bureau of Land Management (BLM), U.S. Department of Interior, the Forest Service administers most aspects of operation of U.S. Mining Laws on National Forest System lands. In addition, under the regulations in 36 CFR 228, the Forest Service approves exploration and mining operating plans and administers those operations to ensure protection and reclamation of affected surface resources.

Leasable Minerals

Federally-owned leasable minerals include fossil fuels (coal, oil, gas, oil shale, etc.), geothermal resources, potassium, sodium, carbon dioxide, phosphates, and sulphur in New Mexico and Louisiana. These minerals are subject to exploration and development under leases, permits or licenses granted by the Secretary of the Interior. The controlling statutes currently are the Mineral Lands Leasing Act of 1920 and amendments, the Mineral Leasing Act for Acquired Lands of 1947, and the Geothermal Steam Act of 1970, whichever applies to the particular resource. The Secretary of the Interior's authority is administered by the Bureau of Land Management. When National Forest System lands are involved, the BLM requests the Forest Service's recommendation for minerals, other than coal, subject to the 1920 Act, or the Forest Service's consent decisions for minerals subject to the 1947 and 1970 Acts and for all coal deposits. Forest Service recommendations for and consent to the BLM for leasing, permitting or licensing except for coal include appropriate stipulations to be included in the issued license, permit or lease for the management of surface resources. The Secretary of the Interior, through the Office of Surface Mining (OSM) for coal and through the Bureau of Land Management for other minerals has the authority to administer operations on National Forest System lands leased, licensed or permitted under his authority.

Prior to approval of operating plans, the Forest Service participates with BLM or OSM in the formulation of the site-specific terms and conditions of operating plans so that the plans provide appropriate mitigation measures to insure that adverse impacts on surface resources will not exceed applicable environmental protection standards. Plans must be designed to minimize the impacts of operations on other uses and surface resources, and to provide for prompt reclamation or restoration of affected lands upon abandonment of operations.

Section 308 of the 1983 Appropriations Act prohibits the expenditure of funds for processing or issuing lease applications in wilderness, RARE II proposed wilderness, further planning areas, and congressionally designated study areas, with certain exceptions. One notable exception pertains to the border areas of National Forest Wildernesses: funds may be used to issue oil and gas leases for the subsurface of such areas if they are immediately adjacent to producing oil and gas fields or areas that are prospectively valuable. Such leases shall allow no surface occupancy.

Salable Minerals

Salable mineral materials, or common varieties, are generally low value deposits of sand, clay, and stone that are used for building materials and road surfacing. Disposal of these materials from the National Forest System is totally at the discretion of and by the Forest Service. Requirements controlling salable mineral material operations are similar to those for leasable minerals.

Current Use and Management - Mining has played an important role in the planning area. The Colorado Mineral Belt crosses the Forest. It has produced zinc, lead, gold, silver, copper, and cadmium. Uranium and vanadium are produced from the Uravan Mineral Belt that lies immediately south of the Uncompahgre Plateau. Large deposits of molybdenum have been discovered.* Much of the Forest has been rated by the U.S. Geological Survey having moderate to high potential for oil and natural gas. Bituminous coal exists adjacent to and in the Forest in the Grand Mesa Coal Field, Delta and Mesa Counties; and in the Cimarron Ridge area; Montrose, Ouray, and Gunnison Counties. Low grade oil shale deposits occur within the Forest boundary.

The Forest encourages environmentally sound energy and minerals development. It emphasizes oil, gas, and mineral exploration and development outside wilderness areas. Emphasis is placed on timely processing of mineral proposals. Equal emphasis is placed on refinement and improvement of procedures to protect surface resources, while permitting the exploration for and extraction of mineral resources.

Most past and present metal production has been from mining districts in Gunnison, Ouray, San Juan, and eastern San Miguel Counties. Current production is mainly zinc, lead, gold, silver, copper, and cadmium from deposits in the Ouray - Telluride - Silverton triangle. Smaller quantities have been produced from the adjacent Ophir and Mount Wilson mining districts in San Miguel county. Gunnison county has several mining districts, including Elk, Gold Creek, Gothic, Pitkin, Ruby, and Tincup. These areas have produced gold, silver, copper, lead, and zinc. No current metal production is recorded from Gunnison County but exploration is being conducted north and west of Crested Butte. Interest in molybdenum has been generated by the Mount Emmons discovery near Crested Butte in 1977. Favorable geology and demand for metals indicate that the planning area will be intensively prospected in the future.

Production in recent years has occurred at the Blue Ribbon Coal Mine, Coal Basin Coal Mine, Homestake Pitch Project, Mount Gunnison Coal Mine, and the Somerset Coal Mine.

Approximately 40% of the Uncompahgre Plateau is currently leased for oil and gas. Over 90% of the Grand Mesa National Forest and the Paoia Ranger District north of the West Elk Wilderness on the Gunnison National Forest have been leased for oil and gas. Minor portions east of the West Elk Wilderness on the Gunnison National Forest have been leased for oil and gas. These are existing commitments and rights granted for mineral development. Some exploration drilling has occurred.

Source: * Proposed Mount Emmons Mining Project Draft EIS.

Five geothermal leases have been issued: four on the Gunnison National Forest, and one on the Uncompahgre National Forest. These leases cover 9,267 acres. No drilling has been done to date.

Seven hundred and fifty five thousand, eight hundred and sixty two acres have been identified having "high" to "moderate" suitability for coal leasing. Two hundred and twenty four thousand, four hundred and ninety one of the suitable acres, were classified unsuitable for coal leasing. Appendix F details the unsuitability assessment for coal mining using the BLM's unsuitability criteria.

The planning area produced \$101,243,955 worth of minerals in 1978. Coal was the most valuable output, followed closely by uranium and vanadium. Table III-31 displays the production breakdown by type of mineral.

TABLE III-31.

MINERAL PRODUCTION SUMMARY

Mineral	Production Dollars
Coal	40,336,832
Oil and Gas	6,722,866
Base and Precious Metals	18,709,594
Uranium/Vanadium	30,561,837
Sand and Gravel	4,912,826
<u>TOTAL</u>	<u>101,243,955</u>

Demand Trends - The demand for mineral commodities fluctuates with economic and technological conditions. The Forest does not directly satisfy minerals demand, but the planning process must consider demand factors. Areas where there is high potential for a mineral resource with a favorable demand outlook should expect an increase in mineral exploration activity. This activity increases the chance of major mineral development.

Increasing demand for mineral resources will accelerate population growth. This growth must be monitored and considered in terms of its impacts on Forest uses and renewable resources.

A minerals discussion of Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area is displayed in the Wilderness section of this chapter.

HUMAN AND COMMUNITY DEVELOPMENT

Current Use and Management - The Forest is currently operating five major manpower programs which provide employment, skill training, experience, and education for a wide range of age groups interested in natural resource management. Manpower programs provide a valuable service to the Forest and at the same time fulfill a U.S. Department of Agriculture commitment to serve the unemployed, underemployed, minorities, and economically disadvantaged youth and elderly through related forestry activities. The following programs exist on the Forest:

- Youth Conservation Corp (YCC). Although YCC is not currently functioning as a Human Resource Program due to limited funding, it has played an active and important role in past years.
- Senior Community Service Employment Program (Older American). The Older American Program, being quite active on the Forest, employs 15 part-time elderly persons whose incomes are within poverty level standards.
- Volunteers. Because individuals participate in this program without compensation numbers of volunteers actively participating at any one time varies substantially. Campground hosts and trail maintenance duties are popular volunteer projects on the Forest.
- Comprehensive Employment and Training Act (CETA). This program has been reduced. It is doubtful the Forest will be able to host the enrollees of the various titles of the Act.
- College Work Study. This cooperative program is one which the Forest has supported within the limits of its funding capacity.

All participants benefit from the manpower programs. The enrollee receives income and training or employment opportunities that are not otherwise available. A program review for 1979 and 1980 indicates a substantial involvement and commitment on the Forest's part.

Demand Trends - The outlook for manpower and youth training programs on the Forest is not encouraging. Many of the programs are Federally funded, with monies coming from other Federal agencies. The Forest's participation is determined primarily by national economic conditions and the political climate.

SUPPORT ELEMENTS

PROTECTION

The protection support elements include fire, forest pest management, animal damage control, law enforcement, and air quality monitoring.

Fire

Current Use and Management - The current fire management program is based on resource protection from fire through fire prevention, presuppression, and fuel treatment. The overall fire management objective is to provide a cost-effective program which responds to land and resource management goals and

objectives. The wildfire suppression objective is to confine each wildfire so that management objectives may be met at reasonable costs. The management program is a coordinated interagency effort involving Federal, State, and local governments. Wildfires have periodically burned large areas of the Forest. These fires have had an important effect on the type, composition, age, quality, and growth rate of the various vegetation types. Analysis indicates that, on an average, 51 fires burn a total of 291 acres annually on the Forest. Approximately 43% of the fires are human caused. Recent trends indicate an increase in man-caused fires and acres burned. Table III-32 summarizes the fire statistics for a "Level 1" fire management analysis for the Forest through the 1971-1980 period.

In 1979, a study was made of four other National Forests in the Rocky Mountain Region to determine their most cost-efficient level of fire protection. The intent of the study was to find the level of budgeted fire protection funding which would result in the lowest total cost of protection, suppression, and resource damages. A comparison of vegetation types was then made to extrapolate the results of this study for application to other National Forests in the Region. This comparison indicated that annual expenditures of \$210,000 (1979 dollars) for fire prevention, detection, manning, equipment, and fuels treatment should result in the least total cost for fire protection on the Forest. In recent years, the Forest's protection program has not been fully funded to the level indicated above. This may account in part for some of the increase in the number of man-caused fires and acres burned as noted in Table III-32.

Fuel treatment to reduce fire hazard has been largely accomplished in connection with vegetation treatment (silvicultural) activities. This includes removing old growth, salvaging dead and down material, slash cleanup for firewood, and prescribed burning to reduce fuel hazard. Vegetation treatment through prescribed burning is also being used extensively for range and wildlife habitat improvement programs.

TABLE III-32.

FIRE STATISTICS
(1971-1980)

Year	Costs		Total Fire Program	Acres Burned	Total Number Fires
	Total FFP* Budget	Suppression			
1971	36,000	8,000	44,000	37	41
1972	73,000	72,000	145,000	53	45
1973	80,000	60,000	140,000	107	24
1974	75,000	112,000	187,000	472	77
1975	72,000	162,000	234,000	55	35
1976	52,000	40,000	92,000	313	50
1977	157,000	120,000	277,000	206	54
1978	137,000	88,000	225,000	488	78
1979	119,000	148,000	267,000	112	50
1980	217,000	394,000	611,000	1062	53
Average 1971-1980	101,400	120,400	222,000	290	51

*FFP=Forest Fire Protection

Demand Trends - The use of prescribed fire to achieve Forest resource management objectives, will continue to increase as more information is gained through research, monitoring and analysis of the physical, biological and economic effects of fire. Fire risk and some increase in the number of man-caused fires can be expected as development and visitor use increases. The fire prevention program including closures, regulated use and public education will require more emphasis with expected population growth.

Forest Pest Management

Current Use and Management - The most prevalent insect pests on the Forest are the Engelmann spruce bark beetle, mountain pine beetle, and the Western spruce budworm. There have been serious outbreaks in the past. Currently, mountain pine beetle is causing resource loss on the Uncompahgre Plateau. This epidemic is being controlled by salvage sales.

Dwarf mistletoe continues to be a problem predominately in the lodgepole pine and to a lesser degree in ponderosa pine. Dwarf mistletoe in lodgepole pine is being reduced by removal of the infested trees using vegetation treatment activities such as timber stand improvement, sales, and destruction of unmerchantable infected stands. Where necessary stands are regenerated using natural or artificial reforestation methods. These practices will continue throughout the planning period.

Controlling mountain pine beetle may require one or a combination of direct chemical treatment, timber harvest, and timber stand improvement. While the

short-term objective is to reduce beetle populations and subsequent tree mortality, the ultimate goal is to create a mosaic of tree age and size classes and to increase species diversity.

The Forest's timber management program in past years has not been at a sufficient level to apply the stocking control and harvesting of mature timber necessary to maintain healthy, vigorous stands. As a result of this lack of silvicultural treatment, many areas on the Forest are susceptible to epidemic insect populations. A large portion of the forested vegetation is overmature and considered highly susceptible to insects and disease. At the present time, the lodgepole pine stands which became established near the beginning of the twentieth century are the most susceptible.

The predominance of mature timber stands on the Forest provides conditions suitable for a number of other diseases such as broom rusts, decaying agents, and cankers. While none of these cause unacceptable losses Forest-wide, they have a significant impact in sensitive areas such as ski areas and campgrounds.

Animal Damage Control

Animal damage control is conducted primarily on sheep allotments to reduce coyote predation. The United States Department of Interior, Fish and Wildlife Service is as the agency authorized to conduct animal damage programs on Federal land as approved by the Forest Service.

Request for predator control are made to the District Ranger by grazing permittees. An evaluation of the losses is made to determine whether control is justified. If action is warranted the type of control, location, and duration of control measures is agreed upon by the Forest Service, Fish and Wildlife Service, and the DOW. These agreements are made on an annual basis.

Emergency control measures, not covered by an agreement, are handled on a case by case basis. The agency responsible for control assumes the responsibility for actions giving early notification to the other agencies.

Law Enforcement

The responsibility for law enforcement rests primarily with the individual county sheriffs. Additional support comes from the Colorado State Patrol and DOW.

Generally, law enforcement problems on the Forest have been minor. Violations are associated with timber trespass, off-road vehicle use, and fire laws. The number of violation notices issued has remained static the last few years.

The Forest has entered into, or participates with adjoining Forests, cooperative law enforcement agreements with all of the counties containing Forest land. The counties involved include Delta, Garfield, Gunnison, Hinsdale, Mesa, Montrose, Ouray, Saguache, San Juan, and San Miguel.

Air Quality

Air quality over most of the Forest is good. The main source of pollutants from Forest activities are, and will continue to be, suspended particulates from wildfire and prescribed burning. Present and imminent external sources of air pollution are associated with dust from roads and exhaust emissions from internal combustion engines.

Through the "Prevention of Significant Deterioration" provisions of the Clean Air Act (42 USC 1857, et seq.), Congress has established a land classification scheme for areas of the country with air quality standards. Class I allows very little additional deterioration of air quality; Class II allows more deterioration; and Class III allows still more. All areas of the Forest are currently classified Class II, except portions of the West Elk Wilderness and the La Garita Wilderness, which are Class I areas.

Demand Trends - Pest control in forest stands is managed to meet long-range objectives through silvicultural practices; particularly harvesting, planting, and utilization practices. Biological, chemical, mechanical, and prescribed burning are considered for epidemic conditions.

Future energy related developments and associated population growth are expected to have a detrimental effect on air quality.

A protection discussion of Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area is displayed in the Wilderness section of this chapter.

LANDS

Forest land use and occupancy is authorized by special use permits, easements, memorandums of understanding, leases, and other agreements. Over 850 special use permits authorize uses such as pasture permits, utilities, ditches and reservoir, and roads. There are 88 existing utility permits with 565 miles of corridor on the Forest. There are four existing electronic sites for commercial and individual uses. Greyhead and Mesa Point are proposed electronic sites for four commercial companies. The Forest has 10 electronic sites for its communication needs. The Forest Service is responsible for managing the surface resources. The Department of Interior is responsible for managing the mineral estate.

Applications for special uses are processed in the order received. In the past five years, special uses which solely benefit private parties have been given low priority for action. Recreation residence permits, although no longer granted, exist on the Forest. The Forest planning process identified no higher resource use for summer home areas for the next 20 years.

Land owned by others within and adjacent to National Forest System boundaries may affect management of and control access to National Forest System land. Location and delineation of the property boundary is necessary for effective land management, and to identify and prevent encroachments and unauthorized use. To date, 2,130 corners and 81.5 miles of boundary have been posted and marked.

Bureau of Land Management activities within and adjacent to the Forest include timber harvest, grazing domestic livestock, wildlife habitat and other natural resource management. These activities are comparable and in most instances compatible with the management activities conducted on National Forest System land.

Landownership Adjustment

Current Use and Management - There are 210,217 acres within the Forest boundary in other ownerships with about 150,000 acres of mineral patents. The landownership pattern and use is complicated and management of small National Forest System parcels is ineffective and inefficient. Ownership changes occur through land exchange, fee purchase, and acquisition of specific rights through easements. Currently, the Forest may only dispose of property through exchange and the townsite authority. Regulations are currently being written to implement disposal through the Small Tracts Act.

The Forest has purchased 735 acres through the Land and Water Conservation Fund Act (L & WCF). There are about seventeen hundred acres of private and/or State-owned land in the existing wilderness areas. Land exchanges will be used to adjust ownership instead of using the L & WCF programs. Current land exchange proposals include 590 acres of offered lands and 590 acres of selected lands.

Forest landownership adjustments are coordinated with the plans and programs of other Federal agencies and State and local governments. Both private and government interest in landownership adjustment is expected to increase from the present level. The Forest Service and BLM Jurisdictional Land Transfer Program is included in the appendicies of the accompanying Plan.

Demand Trends - Land ownership adjustment proposals from private and government agencies are expected to increase in the immediate future.

Withdrawals and Revocations

Current Use and Management - A withdrawal is an action restricting land use and segregating the land from availability for mineral uses. A review and assessment of existing withdrawals is required by the Federal Land Policy Management Act 1976. The procedure requires coordination with the BLM and the U.S. Geological Survey. The appendicies in the accompanying Plan display the schedule for mineral withdrawal and review for the Forest.

Demand Trends - Future management is likely to favor fewer withdrawals from mineral entry. Subject to valid claims and existing leases; after December 31, 1983; wilderness designated by the Wilderness Act of 1964 will be withdrawn from mineral entry and mineral leasing. The Forest does not anticipate new withdrawals for specific administrative sites or other investments (such as new recreation sites). Existing surface management regulations adequately protect other resources, in most cases eliminating the need for other formal withdrawals.

Rights-of-Way Acquisition

Current Use and Management - Non-federal land within and adjacent to the Forest has resulted in management problems that are becoming more critical as demand on public land increases. Areas of the Forest are isolated. Access to and within the Forest for general public use is a public issue. The top priority cases are rights-of-way for timber sales. Condemnation has been used sparingly but may be used more if needed.

Demand Trends - Future demand placed upon most of these activities is expected to accelerate throughout this decade as resource management intensifies. The public demand for access will increase as population increases. Resistance to grant public rights-of-way is likely to also increase.

A lands discussion of Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area is displayed in the Wilderness section of this chapter.

SOILS

Soils are highly variable regarding the degree of development and source of parent material across the Forest. Generally, soils have developed out of parent material of granite, schist, sandstone, shale, limestone, conglomerates, and glacial deposits and are low to moderate in fertility. In certain areas, a heavy clay subsoil causes soil slippage with or without any surface disturbance.

The Forest soil supply is essentially fixed, renewing itself by the slow weathering of bedrock over periods of several hundred years. The role of soils management is to conserve this fixed supply of soil by minimizing erosion. This is accomplished by inventorying soil characteristics, monitoring the use of other forest resources, and providing mitigation measures for reducing erosion.

Current Use and Management - Soils management does not produce outputs when output is defined as goods, services, and products which are purchased, consumed, or used directly by people. However soil is a critical component in the production of timber, range, and forage; as well as general forest vegetation. Soils management is one factor in determining whether that production will increase, remain constant, or decrease over time. Soils management is a support element for the resource elements which produce outputs.

An important factor in determining soil erosion potential for an area is the degree to which that area is cleared of vegetation by other resource development activities. In general development will cause greater soil erosion than preservation when applied to an area. The level at which soil erosion will occur during the 50-year planning horizon is directly related to the management emphasis of an area.

Little current data is available on which to base soil erosion calculations. As surveys are completed, soil erosion losses will be calculated using the Universal Soil Loss Equation.

A soil resource inventory for the Forest is scheduled to be completed by 1989. Slightly over two million acres remain to be inventoried.

Demand Trends - Continuing public concern will require increased management emphasis on maintaining soil productivity.

FACILITIES

Current Use and Management - The Forest has 3,874 miles of road. Of this, 1,240 miles are classified arterial or collectors and 2,634 miles are classified local roads. There are eight forest highways that are part of the State Highway System which access and cross the Forest.

New regulations governing Forest Highway administration and construction went into effect April 12, 1982. A preliminary list of Forest roads which meet the criteria for designation as potential Forest highway projects is displayed in the accompanying Plan.

The arterial and collector road system is essentially in place. Many miles need upgrading or reconstruction, but the corridors are well established.

About 35 miles of road are constructed or reconstructed annually. Currently the Forest provides the minimum road facilities needed to safely accommodate the expected type and volume of traffic.

County road departments maintained 1,475 miles in 1982 under cooperative agreements. Counties are also facing funding constraints and are reluctant to add to their maintenance load. Delta County discontinued cooperative maintenance of Forest roads in 1981.

Areas where indiscriminate off-road driving results in unacceptable erosion or esthetic impacts, and areas where traffic is legally prohibited are closed to off-road vehicle use. Roads are managed to achieve the maximum public good with the available budget. Some roads are closed to protect wildlife values, prevent resource damage, and reduce road maintenance costs. The present travel management status is displayed on the Forest Travel map. This map is available at Forest Offices.

Local roads constructed solely for timber access in the last four years (1978-1981) have been closed by gate and sign. The closures were determined on a project level basis considering resource needs, traffic volume, cost effectiveness, and maintenance capability. Management options for roads are open, restrict, close, or obliterate and rehabilitate. Few existing roads outside of timber sale areas have been closed.

Local roads are being constructed primarily by timber and mineral resource activities. The mileage needed for oil and gas development is presently unpredictable. Most of the activity is in the exploration stage.

Administrative facilities on the Forest include office buildings, work centers, and other service and storage facilities. A total of 98 buildings are owned by the Forest. Many of the buildings are functionally obsolete, with 61% of the buildings 30 years old or older. The buildings are structurally adequate but are deficient from a functional, mechanical, electrical, or energy efficient standpoint. At a rate of 2-3 buildings per year, it would require 18 years to replace those constructed prior to 1940.

The Forest is responsible for 18 dams owned by the Forest Service, 81 bridges, 63 water systems, and 2 waste water and treatment plants. In addition the Forest administers special use permits for 230 dams and 241 ditches and canals. The Forest does not have any solid waste disposal sites. There is one proposal pending for a sanitary landfill near Lake City. The proponent is currently studying several options and has not formally requested a site from the Forest. One option is on National Forest System land. Proposals will be handled on a case-by-case basis through the environmental analysis process. Mitigation measures will be considered.

The Forest has one aerated lagoon currently in operation. No new facilities are planned. Proposals will be handled on a case-by-case basis through the environmental analysis process. Mitigation measures will be considered.

Travel Management

Road use by people, rather than the actual road itself, causes greater impacts on the environment and on other resource uses and activities. Travel management provides direction on managing the use of existing and future roads. Travel management is a combination of managing road and trail use, and area use.

Road and Trail Management - The travel management plan delineates roads and trails that are open, closed or restricted either seasonally or by motorized vehicle type. Wilderness areas, research natural areas, and special interest areas are closed to all motorized vehicles. Major arterial and collector roads are usually open with the exceptions of seasonal or wet weather closures to protect the road investment and reduce resource damage such as erosion and siltation. Where roads are within restricted travel management areas, they would remain open for access to private land or multiple-use activities. These activities can include logging, firewood access, reservoir administration and hunter access. Roads may be closed in a restricted area to further enhance wildlife seclusion, prevent unacceptable resource damage, avoid high hazard locations, or to reduce maintenance costs. All single purpose, newly constructed, local roads are closed. Roads in open areas may be either open or closed based on the same criteria used above for roads within restricted areas. Additional considerations to those criteria are:

--Four-wheel drive recreation roads which are designated in the Forest transportation inventory should remain open.

--Roads should usually remain open within areas that have the following management emphasis:

- a) Semi-primitive motorized recreation
- b) Roaded-natural recreation
- c) Wildlife habitat management but with a semi-primitive motorized recreation opportunity

Seasonal closures are used where resource damage or road investment may be mitigated with such a closure.

Roads and trails are open, closed or restricted based on management goals of the area through which they pass, the land's characteristics, and the prevention of unacceptable resource damage. Additional closures may occur due to insufficient maintenance funds. At that point, priorities have to be set (based on traffic volume, resources served and public needs) to maintain selected roads with available maintenance dollars.

Orders designating some trails as closed to motorized trail vehicles are in effect. Monitoring of existing uses and resulting impacts on resources may require additional closures on some trails. By information displayed on recreation maps, travel management guides, and signing at the trail locations the public will become acquainted with the legal definition of a trail vehicle (i.e. less than 40 inches in width). An impact is occurring more recently with the development of increasing popularity for 4-wheel and 3-wheel all terrain vehicles which are by definition (less than 40 inches) a trail vehicle. These vehicles track width do not coincide or fit traditional trail tread width. Thus a safety and resource damage problem has occurred which may be mitigated by information processes, but cannot be legally enforced without a change in the definition of a trail vehicle in the Code of Federal Regulations. Trails for motorized trail vehicles will safely accomodate "two wheel" trail vehicles.

Area Management - The travel management plan delineates areas as open, closed or restricted to many different modes of travel. Wilderness areas, research natural areas, and special interest areas are closed to all motorized vehicles. Areas that have the following management emphasis: developed winter and summer recreation sites; utility corridors and electronic sites; semi-primitive non-motorized recreation opportunities; and wildlife habitat; were placed in a restricted travel class (i.e. no off road travel) in the initial planning stages. Other considerations are also examined. These considerations are:

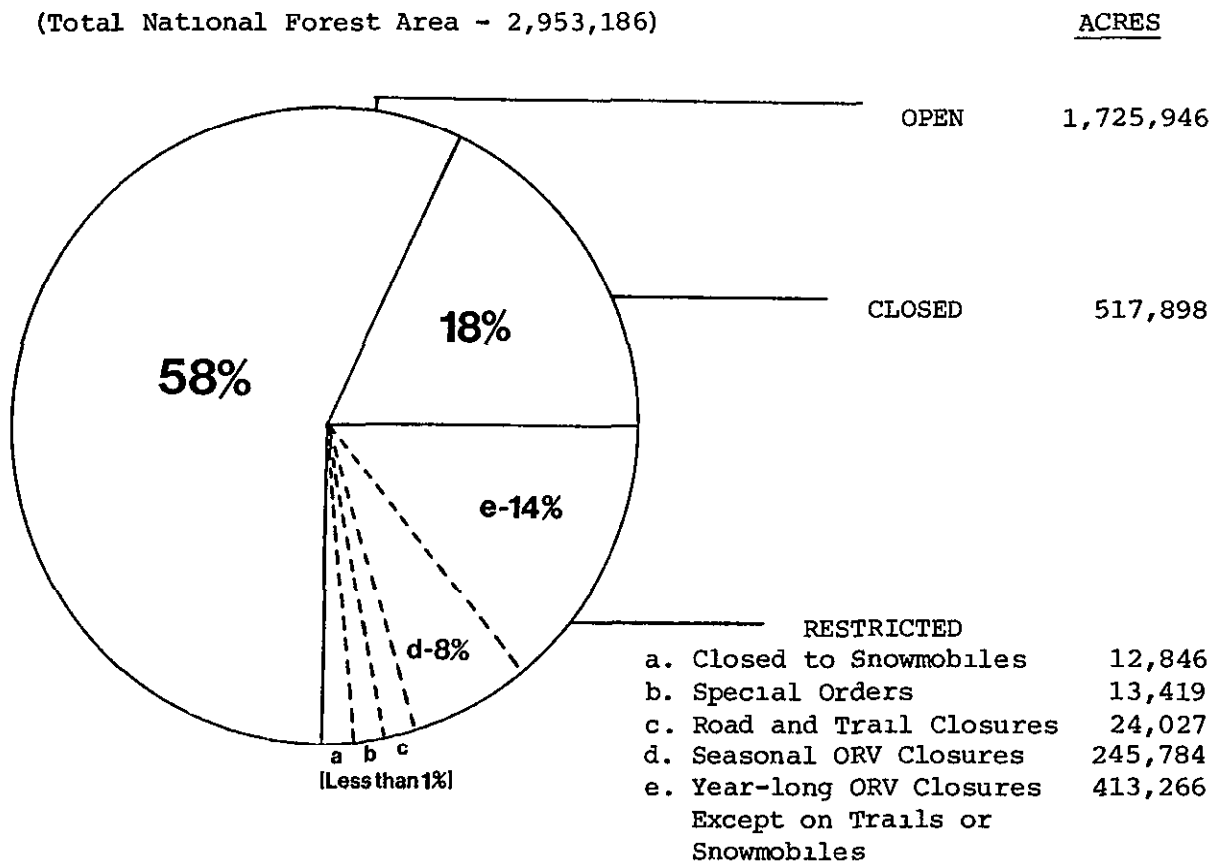
- The physical and biological characteristics of the land. These characteristics include: slope steepness; soil erodibility; vegetative cover - recovery potential; previous experience with resource damage occurring; wildlife and fisheries protection; proximity to streams relating to increased sedimentation and other unacceptable resource damage such as visual.
- Administrative and management concerns. These concerns include: making management areas large enough for efficient and effective law enforcement and administration; achieving a balance of recreation opportunities such as semi-primitive non-motorized and semi-primitive motorized within land characteristics delineating area boundaries on a map that are easily discernible by the public such as streams, roads, ridge tops, for effective understanding and cooperation of the public; and achieving consistency between ranger district boundaries, National Forest boundaries, and adjacent lands and agencies such as BLM.

All of these considerations are blended to arrive at the travel management plan. Continued monitoring of the travel management plan is necessary to re-evaluate and assess on an annual basis the attainment of this goal. Yearly

adjustments will be made to the travel management plan. It is important for the public to assist the Forest Service by providing information as to specific problems or resource degradation occurrences. In summary, the objective of effective travel management is to provide a safe, environmentally sound, and efficient transportation system. Figure III-18 displays the acres open, closed, or restricted to motorized vehicle use.

FIGURE III-18.

TRAVEL MANAGEMENT



Demand Trends - There will be a continuing demand for reconstruction of existing buildings due to their age and condition. Demand for use of Forest roads is significant. Four-wheel drive interests want more opportunities for off-road use. Sightseers want more roads with better driving surfaces. Non-motorized recreationists want fewer roads. Public understanding of travel management is necessary for public acceptance of area and road closures or restrictions.

A facilities discussion of Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area is displayed in the Wilderness section of this chapter.



IV. Environmental Consequences

CHAPTER IV ENVIRONMENTAL CONSEQUENCES

OVERVIEW

This chapter describes the environmental consequences of implementing the Proposed Action or any of the alternatives to it. It forms the scientific and analytic basis for the comparison of the alternatives considered in detail, identified in Chapter II. This chapter also discloses the significant environmental consequences outlined in Chapter II.

The estimated effects of the alternatives result from the application of various combinations of management prescriptions. In each alternative, this prescription mix provides various ways to meet the goal of a healthy, vigorous forest environment by producing different levels of resource outputs, goods, and services. These resource outputs can include recreation capacity, habitat diversity, timber production, water yield, and grazing use. The interaction between the output levels and place of their production yields distinct environmental consequences.

Environmental effects can be either beneficial or adverse; direct or indirect. Effects vary in importance from negligible to those which are significant; and vary in duration from immediate and short-term (ten years or less) to long-term (over ten years). Environmental consequences are displayed in this chapter for resource and support elements by alternative for the following time periods:

Period 1: 1981 - 1985
Period 2: 1986 - 1990
Period 3: 1991 - 2000

Period 4: 2001 - 2010
Period 5: 2011 - 2020
Period 6: 2021 - 2030

Each alternative considered in detail is comprised of different combinations of management prescriptions. The land management allocations for each alternative are displayed in Table IV-1 and the alternative maps attached to this Final EIS. The environmental consequences of each alternative are based upon the results of implementing the different combinations of management prescriptions. Many adverse effects are eliminated from all alternatives by applying Forest Direction Management Requirements displayed in the Plan. Management Requirements ensure, among other things, long-term land productivity is not impaired by any alternative. The prescriptions for management areas, including mitigation measures, are displayed in detail in Chapter III of the Plan. Mitigations are also discussed under the appropriate resources in this chapter. A mitigation summary is also displayed at the end of this chapter.

Environmental consequences are grouped by resource and support elements. Direct, indirect, beneficial, and adverse effects are discussed together. Interactions between resource elements (such as changes in support activity) are identified. Outputs and demand are reported as average annual for the period unless otherwise noted.

This Chapter also discloses the site specific consequences of alternative forms of management for Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area. The following list displays the Cannibal Plateau and Fossil Ridge alternatives referenced in this Chapter.

--Alternative A, Unsuitable for inclusion in the National Wilderness Preservation System, no action.

--Alternative B, Partially suitable for inclusion in the National Wilderness Preservation System.

--Alternative C, Suitable for inclusion in the National Wilderness Preservation System.

--Alternative D, Unsuitable for inclusion in the National Wilderness Preservation System.

Environmental consequences are displayed in the individual resource elements.

DIRECT AND INDIRECT ENVIRONMENTAL EFFECTS

Environmental consequences result from implementing a set of management prescriptions in an alternative. Table IV-1 displays prescriptions for management areas by alternative. A description of management area prescriptions for Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area is displayed in Appendix I.

TABLE IV-1.

ACREAGE ALLOCATION BY MANAGEMENT AREA PRESCRIPTION FOR EACH ALTERNATIVE
(Acres)

Mgmt. Area Prescription	Emphasis	Alternatives								
		1 Proposed	2 No Action	3 RPA	4	5	6	7	8	9
1A	National Forest System Developed Recreation Sites.	1,117	955	1,279	1,279	955	1,117	955	1,117	955
1B	Existing winter sports sites.	8,191	8,191	8,191	8,191	8,191	8,191	8,191	8,191	8,191
1D	Utility corridors and electronic sites.	4,535	4,535	4,535	4,535	4,535	4,535	4,535	4,535	4,535
2A	Semi-primitive motorized recreation opportunities. Range management will reduce conflicts between recreation and livestock.	490,433	490,077	482,595	566,874	477,463	591,883	461,589	493,303	850,144
2B	Roaded natural and rural recreation opportunities. Major travel routes. Maintained or improved visual quality. Range management will reduce conflicts between recreation and livestock. Timber harvest.	140,000	125,446	130,429	127,859	129,679	127,859	130,186	131,021	0
3A	Semi-primitive non-motorized recreation opportunities. User density is controlled by access.	36,391	94,812	39,228	84,811	56,413	84,784	63,977	49,159	0
4B	Wildlife habitat management for one or more management indicator species. Livestock grazing will be compatible with wildlife habitat management.	104,757	128,135	129,285	156,520	130,975	165,298	118,886	140,823	155,867
4C	Wildlife habitat improvement. Vegetation treatment in hardwood and shrub dominated land. Livestock grazing will be compatible with wildlife habitat management.	221,796	222,275	191,403	227,270	131,624	227,243	113,067	222,853	88,423
4D	Wildlife habitat management. Livestock grazing will be compatible with wildlife habitat management. Clearcut aspen only. Slopes less than 40%.	21,139	27,496	28,162	67,959	27,213	67,941	48,921	51,353	23,399

TABLE IV-1. (Cont.)

Mgmt. Area Prescription	Emphasis	Alternatives								
		1 Proposed	2 No Action	3 RPA	4	5	6	7	8	9
5A	Big game winter range in non-forest areas. Travel management prevents unacceptable stress. Livestock grazing managed to favor wildlife habitat.	206,305	210,496	207,616	220,097	220,428	220,097	202,023	214,023	229,731
5B	Big game winter range in forest areas. Travel management prevents unacceptable stress. Vegetation treatment will enhance plant and animal diversity. Livestock grazing managed to favor wildlife habitat.	36,389	32,198	35,078	22,597	22,266	22,597	40,671	28,671	12,963
6A	Livestock grazing. Improve forage composition. Vegetation treatment in mountain grass, meadow, and shrub; oakbrush; and aspen types. All slopes.	1,001	1,001	1,001	1,001	1,001	1,001	1,001	1,001	1,001
6B	Livestock grazing. Maintain forage composition. Vegetation treatment in mountain grass, meadow, and shrub; oakbrush; and aspen types. All slopes.	797,144	770,005	796,957	670,401	861,504	676,040	855,414	741,005	847,493
7A	Intensive timber management. Clearcut harvest in aspen, spruce-fir, and lodgepole pine types. Slopes less than 40%.	18,926	6,388	22,243	5,076	20,060	4,263	10,310	9,066	4,598
7C	Intensive timber management. Clearcut harvest in lodgepole pine type. Group Selection harvest in spruce-fir type. Slopes greater than 40%.	3,221	3,074	16,808	768	3,192	1,774	5,447	5,821	2,622
7E	Intensive timber management. Shelterwood harvest in spruce-fir and ponderosa pine types. Clearcut lodgepole pine. Slopes less than 40%.	296,097	275,886	306,510	157,125	305,821	148,723	257,190	285,495	171,048
8A	Pristine wilderness setting. Very high levels of solitude. High opportunity for challenge, risk and self-reliance. No trails present.	105,475	103,752	103,752	206,382	103,752	100,134	189,628	105,475	103,752

TABLE IV-1. (Cont.)

Mgmt. Area Prescription	Emphasis	1 Proposed	2 No Action	3 RPA	Alternatives					
					4	5	6	7	8	9
8B	Primitive wilderness setting. High level of solitude. High opportunity for challenge, risk, and self-reliance.	185,464	172,076	172,076	220,065	172,076	256,459	200,907	179,356	172,076
8C	Semi-primitive wilderness setting. Moderate level of solitude. Moderate opportunity for challenge, risk, and self-reliance.	176,278	165,700	165,700	87,286	165,700	106,086	116,013	170,296	165,700
8D	High density wilderness setting. Heavy day use. Low level of solitude. Low opportunity for challenge, risk, and self-reliance.	0	12,090	12,090	19,275	12,090	38,838	26,460	12,090	12,090
9A	Riparian area management. One hundred feet of perennial stream edges. Does not apply to wildernesses, special interest areas, and research natural areas.	25,826	25,897	25,897	25,414	25,897	25,622	25,414	25,826	25,897
9B	Intensive water augmentation. Increase water quantity on suitable timberland. Snowpack management.	14,580	14,580	14,580	14,580	14,580	14,580	14,580	14,580	14,580
10A	Research Natural Areas.	1,461	1,461	1,111	1,461	1,111	1,461	1,461	1,461	1,461
10C	Special Interest Areas. Cultural Areas. National Natural Landmarks.	1,061	1,061	1,061	761	1,061	1,061	761	1,061	1,061
10E	Municipal Watersheds.	7,440	7,440	7,440	7,440	7,440	7,440	7,440	7,440	7,440

VEGETATION

Vegetation on the Forest is one of the most important and dominant features of the landscape. How this resource is managed is largely the subject of this Final EIS and Forest Plan. In all Forest areas, vegetation treatment will provide a wide range of benefits. Most of the non-forest vegetation can be classified grass, alpine, or shrubland. It provides benefits that include natural beauty, forage for wildlife and domestic animals, hiking, camping, and nature study. Opportunities to manage the desired non-forested vegetation include planting, fencing, and prescribed burning. Opportunities also exist to manage the vegetation in its natural state.

Approximately 17 percent of the Forest is classified wilderness and is managed to permit natural plant succession. Outside wilderness, the degree to which the vegetation types are managed varies by objective, location, characteristics of the plant community and the site conditions involved.

Aspen covers 17 percent of the Forest. In the past 50 years fire control and the absence of other catastrophic events has resulted in vast areas of the Forest being covered by old and mature aspen. This situation is a major concern. Much of the aspen stands will convert to spruce/fir or brush through natural succession if not regenerated to younger trees. The loss of aspen and their magnificent fall colors would be significant. Maintaining aspen requires that the old trees be replaced by young trees. This can be accomplished with vegetation treatment activities such as burning or cutting to permit new trees to develop from root sprouts. These activities are limited by the expense and poor market for aspen.

Perpetuation of the existing 521,198 acres of aspen would require regeneration of approximately 5800 acres annually over the next 90 years (using a 90 year average rotation) and at least 5800 acres each year thereafter to prevent natural succession to other vegetation types. Since many areas of the existing aspen are near the end of normal life expectancy (pathological rotation), regeneration needs to be accelerated in the next few decades. The final determination of the rate of acceleration needed depends on a site-specific examination of each aspen stand.

Spruce, fir, and lodgepole pine play a very important role in providing wildlife habitat, recreational opportunities, and visual quality. Most of the spruce, fir, and lodgepole pine are old and susceptible to insect, disease, and fire. Large areas covered with dead trees, while of benefit to some wildlife, are generally considered unattractive. A well balanced vegetation pattern results in a healthy forest. The degree to which the trees are managed to achieve the desired balance is related to many factors including site objective, slope, tree species, and economics.

Table IV-2 displays the vegetation treated by various management activities in each alternative. Under all alternatives, the acres treated is very small and generally less than one percent per year.

TABLE IV-2.

AVERAGE ANNUAL VEGETATION TREATMENT
(Thousand Acres)

Alternative/ Activity*	Time Period					
	1981- 1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
<u>ALTERNATIVE 1</u>						
Wild. Hab. Impr.	4.5	5.5	5.5	5.5	5.5	5.5
Aspen Treatment	.5	.5	.5	.8	.8	.8
Timber Harvest	7.1	7.1	6.0	6.6	6.6	6.3
Reforestation	.6	1.0	1.0	1.0	1.0	1.0
Thr. St. Impr.	1.2	.3	.2	.5	.5	.7
Act. Fuel Treat.	1.9	1.8	2.0	1.6	1.6	1.6
Soils and Water	.1	.1	.1	.1	.1	.1
<u>TOTAL</u>	<u>15.9</u>	<u>16.3</u>	<u>15.3</u>	<u>16.1</u>	<u>16.1</u>	<u>16.0</u>
<u>ALTERNATIVE 2</u>						
Wild Hab. Impr.	4.5	5.5	5.5	5.5	5.5	5.5
Aspen Treatment	.5	.5	.5	.5	.5	.5
Timber Harvest	4.7	4.7	4.0	4.5	6.1	5.8
Reforestation	.6	.4	.4	.4	.4	.4
Thr. St. Impr.	.6	.6	.6	.6	.6	.6
Act. Fuel Treat.	2.5	3.0	3.0	3.0	3.0	3.0
Soils and Water	.2	.2	.1	.1	.1	.1
<u>TOTAL</u>	<u>13.6</u>	<u>14.9</u>	<u>14.1</u>	<u>14.6</u>	<u>16.2</u>	<u>15.9</u>
<u>ALTERNATIVE 3</u>						
Wild. Hab. Impr.	4.5	5.5	5.5	5.5	5.5	5.5
Aspen Treatment	.5	.5	.5	.8	.8	.8
Timber Harvest	7.5	7.5	7.5	8.3	7.9	10.1
Reforestation	.6	1.0	1.0	1.0	1.0	1.0
Thr. St. Impr.	1.2	.3	.2	.5	.5	.7
Act. Fuel Treat.	1.9	1.8	2.0	1.6	1.6	1.6
Soils and Water	.1	.1	.1	.1	.1	.1
<u>TOTAL</u>	<u>16.3</u>	<u>16.7</u>	<u>16.8</u>	<u>17.8</u>	<u>17.4</u>	<u>19.8</u>

TABLE IV-2. (Cont.)

Alternative/ Activity*	Time Period					
	1981- 1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
<u>ALTERNATIVE 4</u>						
Wild. Hab. Impr.	5.0	6.0	6.0	6.0	6.0	6.0
Aspen Treatment	.8	.8	.8	2.0	2.0	2.0
Timber Harvest	3.2	3.2	2.7	3.0	2.9	3.5
Reforestation	.7	0.0	0.0	0.0	0.0	0.0
Thr. St. Impr.	.6	.6	.6	.6	.6	.6
Act. Fuel Treat.	2.0	2.5	2.5	2.5	2.5	2.5
Soils and Water	.1	.1	0.0	0.0	0.0	0.0
<u>TOTAL</u>	<u>12.3</u>	<u>13.2</u>	<u>12.6</u>	<u>14.1</u>	<u>14.0</u>	<u>14.6</u>
<u>ALTERNATIVE 5</u>						
Wild Hab. Impr.	3.0	4.0	4.0	4.0	4.0	4.0
Aspen Treatment	.5	.5	.5	.8	.8	.8
Timber Harvest	7.1	7.1	6.0	6.6	6.5	5.8
Reforestation	.7	.5	.5	.5	.5	.5
Thr. St. Impr.	1.0	1.0	1.0	1.0	1.0	1.0
Act. Fuel Treat.	3.0	3.5	3.5	3.5	3.5	3.5
Soils and Water	.2	.2	.1	.1	.1	.1
<u>TOTAL</u>	<u>15.5</u>	<u>16.8</u>	<u>15.6</u>	<u>16.5</u>	<u>16.4</u>	<u>15.7</u>
<u>ALTERNATIVE 6</u>						
Wild. Hab. Impr.	5.0	6.0	6.0	6.0	6.0	6.0
Aspen Treatment	.8	.8	.8	2.0	2.0	2.0
Timber Harvest	3.1	3.1	2.7	2.9	3.7	3.6
Reforestation	.7	0.0	0.0	0.0	0.0	0.0
Thr. St. Impr.	.6	.6	.6	.6	.6	.6
Act. Fuel Treat.	2.0	2.5	2.5	2.5	2.5	2.5
Soils and Water	.1	.1	0.0	0.0	0.0	0.0
<u>TOTAL</u>	<u>12.3</u>	<u>13.1</u>	<u>12.6</u>	<u>14.0</u>	<u>14.8</u>	<u>14.7</u>

TABLE IV-2. (Cont.)

Alternative/ Activity*	Time Period					
	1981- 1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
<u>ALTERNATIVE 7</u>						
Wild. Hab. Impr.	4.0	4.0	4.0	4.0	4.0	4.0
Aspen Treatment	.8	.8	.8	.8	.8	.8
Timber Harvest	6.5	6.5	5.6	6.2	5.6	5.6
Reforestation	.7	.5	.5	.5	.5	.5
Tbr. St. Impr.	.9	.9	.9	.9	.9	.9
Act. Fuel Treat.	2.5	3.0	3.0	3.0	3.0	3.0
Soils and Water	.2	.1	.1	.1	.1	.1
<u>TOTAL</u>	<u>15.6</u>	<u>15.8</u>	<u>14.9</u>	<u>15.5</u>	<u>14.9</u>	<u>14.9</u>
<u>ALTERNATIVE 8</u>						
Wild Hab. Impr.	4.0	4.0	4.0	4.0	4.0	4.0
Aspen Treatment	.8	.8	.8	.8	2.0	2.0
Timber Harvest	7.2	7.2	6.2	6.7	6.3	5.9
Reforestation	.7	.5	.5	.5	.5	.5
Tbr. St. Impr.	1.0	1.0	1.0	1.0	1.0	1.0
Act. Fuel Treat.	3.0	3.5	3.5	3.5	3.5	3.5
Soils and Water	.2	.2	.1	.1	.1	.1
<u>TOTAL</u>	<u>16.9</u>	<u>17.2</u>	<u>16.1</u>	<u>16.6</u>	<u>17.4</u>	<u>17.0</u>
<u>ALTERNATIVE 9</u>						
Wild. Hab. Impr.	2.3	2.3	2.3	2.3	2.3	2.3
Aspen Treatment	.4	.4	.5	.5	.5	.5
Timber Harvest	4.6	4.6	3.9	4.2	3.9	3.8
Reforestation	.6	.6	.6	.6	.6	.6
Tbr. St. Impr.	1.5	1.5	1.5	1.5	1.5	1.5
Act. Fuel Treat.	.2	.2	.2	.2	.2	.2
Soils and Water	0.0	0.0	0.0	0.0	0.0	0.0
<u>TOTAL</u>	<u>9.6</u>	<u>9.6</u>	<u>9.0</u>	<u>9.3</u>	<u>9.0</u>	<u>8.9</u>

*Activities: Wild. Hab. Impr. = Wildlife Habitat Improvement
 Tbr. St. Impr. = Timber Stand Improvement
 Act. Fuel Treat. = Activity Fuel Treatment
 Soils and Water = Soils and Watershed Management

Vegetation treatment through commercial timber harvest is designed to achieve multiple-use objectives on suitable timberland. Although not immediately apparent from a comparison of program costs and dollar receipts, a substantial part of the vegetation treatment program on the Forest is accomplished through the commercial timber sale program. As a result of the timber sale program, accomplishments occur in insect and disease control, wildlife habitat improvement, range improvement, recreation enhancement, the firewood program, cultural resource discovery, and watershed improvements.

Timber sale receipts on the Forest have not covered sale preparation costs in recent years. Benefits, however, have accrued to the resources identified above and cannot be ignored when evaluating the economic efficiency of the timber program. For example, in order to produce the wildlife benefits resulting from timber harvesting, the wildlife budget would have to be substantially increased. Table IV-3 estimates the economic contributions that timber and associated activities currently make to other resources.

Table IV-3.

TIMBER ECONOMIC CONTRIBUTIONS TO OTHER RESOURCES

Proposed Forest Program	Annual Budget Requirement to Achieve Proposed Objectives of Selected Forest Programs		Net Increases Required Without A Timber Program
	(With Proposed Timber Program)	(Without Proposed Timber Program)	
Recreation	\$873,600	\$1,171,600	\$298,000
Wildlife	312,400	712,400	400,000
Protection			
I&DC	3,700	99,700	96,000
Fire Management	290,300	337,900	47,600
Water	68,200	149,000	81,000

These figures do not represent precise budget requirements. They display the opportunity costs associated with a no harvest timber program. The estimates displayed in Table IV-3 are conservative.

Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area

Alternatives A, B and C of both Fossil Ridge WSA and Cannibal Plateau FPA will not have any significant effect on vegetation. Natural succession processes would be the dominant course of change for the WSA and FPA. Additional discussion of vegetation in the WSA and FPA is displayed in the Timber section of this chapter.

In alternative D of Fossil Ridge WSA, 4,915 acres could be treated by various management activities. In alternative D of Cannibal Plateau FPA, 28,223 acres could be treated by various management activities. The impacts of these vegetation treatments for alternative D in both Fossil Ridge WSA and Cannibal Plateau FPA are displayed under the various resources of this chapter.

In alternatives A, B and C for both Fossil Ridge WSA and Cannibal Plateau FPA, there are no scheduled vegetation treatments over the 50-year planning horizon. In alternative D for the WSA and FPA, over the 50-year planning horizon, the only vegetation treatment scheduled is timber harvest. However, no vegetation treatment in alternative D is scheduled over the next ten years.

RECREATION

All alternatives will provide a wide range of Forest oriented recreation. Environmental effects associated with developed recreation are a result of site construction, downhill ski area development, and road and trail management.

Existing developed recreation site capacity is 744,000 RVD's/yr. This is not sufficient to meet projected demand over the 50-year planning horizon. Alternatives were developed to supply different capacity levels. Table IV-4 displays developed recreation demand and site capacity by alternative.

TABLE IV-4.

DEVELOPED RECREATION SITE CAPACITY AND PROJECTED DEMAND (Thousands of Recreation Visitor Days)

Time Period	Demand	Alternative			
		1,6,8	2,5,7	9	3 & 4
1981-1985	617	744	744	657	744
1986-1990	695	744	744	657	744
1991-2000	812	778	744	657	812
2001-2010	968	866	744	657	968
2011-2020	1,124	924	744	657	1,124
2021-2030	1,280	1,012	744	657	1,280

Alternatives 3 and 4 schedule sufficient recreation site construction and rehabilitation to meet 100% of demand over the 50 year planning horizon. A substantial portion of the projected budget requirements for Alternatives 3 and 4 is for developed recreation construction. Alternatives 1, 6, and 8 schedule sufficient increase in capacity to meet 96% of demand between 1991 and 2000. This is reduced to about 79% by 2030. Alternatives 2, 5, and 7 maintain developed site capacity at the current level. They would meet 91% of demand by the year 2000, gradually reducing to 58% by 2030. Alternative 9, due to budgetary constraints, decreases current capacity by shortening the use season

on existing developed sites and maintains that level over the planning horizon. The least cost-effective and low use sites will be closed. Those remaining open will be operated at a reduced service level. Reduced season sites will be located throughout the Forest to provide developed recreation opportunities. Alternative 9 does not meet demand beyond 1986.

The Proposed Action would supply facilities to meet a minimum of 50% of projected demand above existing capacity for developed recreation facilities. This would increase the developed recreation capacity to meet about 96% of total demand by the year 2000 and gradually reduce to 79% of total demand by 2030. Forty-five percent of the sites will be operated at full service, with some inconvenience to the public seeking full service accommodations at the other 55%. Demand for camping and picnicking in excess of existing capacity will have to be met either by the private sector or at dispersed, undeveloped sites on the Forest.

Two commentors, K. T. and Nate Lund stated, "To follow this management plan will mean to destroy the tourist industry in Gunnison County." Economic impact analysis indicates this is not true. Under the Proposed Action total income will increase 10.5% in the Economic Impact Area. All employment sectors within the economic impact area show growth over current management during the first 10 years.

There is an opportunity for the private sector to supply developed recreation opportunities to meet demand not supplied by the Forest. This could occur in alternatives 1, 2, 5, 6, 7, 8, and 9.

Undeveloped campsites will continue to be used in all alternatives but would receive greater use under those alternatives which do not meet demand for developed recreation. Undeveloped campsites can impact the soil, water and vegetation resources by concentrating human use. In all alternatives, significant impacts will be mitigated. Mitigation includes closure, closure enforcement, rehabilitation at the undeveloped sites and by directing use to areas that can be controlled and monitored.

Outfitter and guide operations are an important industry on the Forest. Approximately 125 permits are issued annually. No alternative will significantly affect these operations.

For all alternatives the demand for downhill skiing opportunities can be met by expanding existing sites to their presently approved potential capacity. All master plans incorporate mitigation measures to reduce impacts.

The Forest will retain downhill skiing opportunities on eight potential sites by scheduling management activities compatible with their long-term future as downhill ski areas in all alternatives. Chapter III displays the potential ski sites by Regional Priority. Management Area Direction for downhill ski areas is displayed in Plan, Chapter III, in Management Area Prescription 1B. Existing site expansion is encouraged over new site development. The Forest does not actively encourage new development, but responds to proponent interest on an individual basis. Environmental effects associated with downhill skiing areas are determined by ski area development and road and trail management. The same impacts could occur at any of the existing or potential sites in all alternatives.

Table IV-5 displays the anticipated total developed recreation use by alternative. After the end of the first decade, non-skiing developed recreation use will be limited by site capacity, but ski area development is expected to keep pace with demand.

TABLE IV-5.

DEVELOPED RECREATION USE
(Average Annual, Thousand Recreation Visitor Days)

Alternative	Time Period	Non-Skiing Dev. Rec.	Downhill Skiing	Total Developed Recreation
3, 4	1981-1985	617	269	886
	1986-1990	695	362	1,057
	1991-2000	812	502	1,314
	2001-2010	968	689	1,657
	2011-2020	1,124	876	2,000
	2021-2030	1,280	1,063	2,343
1, 6, 8	1981-1985	617	269	886
	1986-1990	695	362	1,057
	1991-2000	778	502	1,280
	2001-2010	866	689	1,555
	2011-2020	924	876	1,800
	2021-2030	1,012	1,063	2,075
2, 5, 7	1981-1985	617	269	886
	1986-1990	695	362	1,057
	1991-2000	744	502	1,246
	2001-2010	744	689	1,433
	2011-2020	744	876	1,620
	2021-2030	744	1,063	1,807
9	1981-1985	617	269	886
	1986-1990	657	362	1,019
	1991-2000	657	502	1,159
	2001-2010	657	689	1,346
	2011-2020	657	876	1,533
	2021-2030	657	1,063	1,720

Demand for dispersed recreation opportunities will be met by all alternatives. Dispersed motorized recreation capacity will be increased as new roads are constructed to support resource activities. Travel management designations are determined by land use allocations. Travel management is displayed in Chapters III and IV in the "Facilities" section for all alternatives.

The opportunity for semi-primitive non-motorized recreation results in minimal disturbances to natural ecosystems from other management activities. Table IV-6 displays the land use allocations for potential semi-primitive non-motorized recreation opportunities outside the wilderness areas. Demand for semi-primitive non-motorized recreation will be met in all alternatives.

Vegetation treatment, soil disturbance, noise, and dust associated with resource activities could reduce the quality of the semi-primitive non-motorized recreation experience in the vicinity and for the duration of these management activities in all alternatives. These impacts will be localized and short-term. The Plan, Chapter III, Forest Direction, Management Activity Transportation System Management L01, mitigates impacts for all alternatives. Additional discussion is displayed in the "Facilities" section of this chapter.

TABLE IV-6.

POTENTIAL SEMI-PRIMITIVE NON-MOTORIZED RECREATION
(ACRES)

Alternative	Acres Outside Wilderness	Percent of Total Acres
1	482,400	16.6
2	420,500	14.5
3	463,250	15.9
4	404,200	13.9
5	431,400	14.8
6	408,400	14.1
7	408,950	14.1
8	412,350	14.2
9	477,900	16.4

Non-wilderness acres currently suitable for dispersed non-motorized recreation will in the future be roaded under some prescriptions. This could increase the opportunity for dispersed motorized use. However, some newly developed roads may be closed because of management area direction. These road closures are needed to protect resources such as wildlife habitat effectiveness and watershed quality. Some roads will be closed to reduce maintenance and associated costs. Road closures will also continue to provide dispersed non-motorized recreation in all alternatives.

Much of the dispersed recreation use on the Forest, both motorized and non-motorized, occurs on Forest trails. Recreation quality is influenced by trail condition. Trails in poorer condition may detract from a recreation experience when the traveler has to concentrate on avoiding potential hazards or is disturbed by perceived site degradation. Increased use is expected of the maintained trails. This could lead to density levels detrimental to the recreation experience and conflicts between use types. The alternatives vary significantly in trail construction and reconstruction schedules. Table IV-7 displays the trail construction and reconstruction schedule for each alternative.

Most trail construction projects will be reconstruction of existing trails. Construction of new trails may be in the vicinity of cultural resources but mitigation measures prescribed in the management requirements of the Plan will prevent damage to these resources.

TABLE IV-7.

TRAIL CONSTRUCTION/RECONSTRUCTION
(Miles Per Period)

Time Period	Alternative				
	4	1,6	2,5,7,8	3	9
1981-1985	500	250	75	55	0
1986-1990	500	250	75	55	0
1991-2000	1,000	500	150	240	0
2001-2010	150	500	150	410	0
2011-2020	150	500	150	600	0
2021-2030	150	450	150	760	0
<u>TOTAL*</u>	<u>2,450</u>	<u>2,450</u>	<u>750</u>	<u>2,120</u>	<u>0</u>

* Total miles in 50-year planning horizon.

Alternatives 1, 4, and 6 emphasize trail construction and reconstruction to enhance dispersed recreation opportunities, but do so on different schedules. Alternative 3 schedules mileage similar to the above alternatives. Alternative 3 emphasizes existing trails inside wilderness areas.

Alternatives 2 (Current management), 5, 7, and 8 schedule smaller trail programs to maintain existing trail-related dispersed recreation opportunities at the current level of quantity and quality.

Alternative 9 schedules a decrease in trail-related dispersed recreation opportunities as trail conditions deteriorate.

The proposed Continental Divide National Scenic Trail is managed similarly in each alternative. Much of the trail corridor on the Forest passes through wilderness, and its management is compatible with wilderness management. Trail management will follow Management Requirements displayed in Chapter III of the Plan.

The local short and long-term consequences of some management practices such as road construction and vegetation treatment will be a local reduction in visual quality. While these activities will occur in certain portions of the Forest under any alternative, other activities may be occurring at the same time in other parts of the Forest such as road obliteration and vegetation treatment to increase diversity and improve the visual condition. Roads built in some areas will have a positive effect of increasing seen area for a certain segment of the

public who would not have the opportunity to view or access the area without the road. Short-term local reductions in visual quality will be mitigated by the Management Requirements displayed in Chapter III of the Plan in all alternatives. With the exceptions of new roads, buildings, ski areas, and utilities; vegetation which is cleared for other purposes will be regenerated and replaced by younger vegetation in all alternatives.

Cultural resource management can impact other resources similarly in all alternatives. Market output alternatives 1, 3, 5, 7 and 8 are affected more than non-market output alternatives 2, 4, 6 and 9. Cultural resources can restrict project activities. Restrictions can vary from limiting ground disturbance around a significant cultural site to limiting access to an area. If avoidance was limited, cultural resource management could increase project costs to finance mitigation measures in all alternatives. Recreation activities could increase in all alternatives, if significant cultural resources are interpreted for the public. Cultural resources could increase academic and lay interest in our cultural heritage and provide visitor-related and cultural resource management jobs.

Other resources can impact the cultural resource. Alternatives 1, 3, 5, 7 and 8 pose the greatest potential for disturbance of cultural resources. At the same time, appropriate survey and mitigation provides the greatest opportunity for cultural resource recognition, preservation and development for public benefit. Resource activity impacts could cause alteration, isolation or destruction of significant cultural resources in all alternatives. Increased potential for vandalism could occur. These impacts could increase protection costs through increased monitoring and additional mitigation needs.

If located cultural resources eligible to the National Register cannot be avoided and it is determined there will be an adverse effect; the Forest prepares a mitigation plan. This mitigation plan is prepared in consultation with the State Historic Preservation Officer. Mitigation in all alternatives could include: avoidance of the resource by modifying a portion of the management activity; partial or total collection of archeological resource with surface only artifacts; partial or total excavation of an archeological resource with sub-surface artifacts; draw, photograph and describe standing structures; and recondition standing historic buildings for use. A cultural resource could also need protection such as fences, guards and road closures. The proposed mitigation plan is approved by the Advisory Council on Historic Preservation. The council prepares a Memorandum of Agreement (MOA) to accomplish the mitigation. The MOA is monitored by the State Historic Preservation Officer.

Fossil Ridge Wilderness Study Area

Recreation related impacts in Fossil Ridge are primarily dispersed in nature.

Table IV-8 displays dispersed recreation capacity by recreation opportunity spectrum (ROS) class and alternative. Figure IV-1 displays ROS classes for Alternative B. Figure IV-2 displays ROS classes for Alternative C. The ROS classes for Alternatives A and D are displayed in Chapter III, Wilderness section.

TABLE IV-8.

DISPERSED RECREATION CAPACITY
FOSSIL RIDGE WILDERNESS STUDY AREA

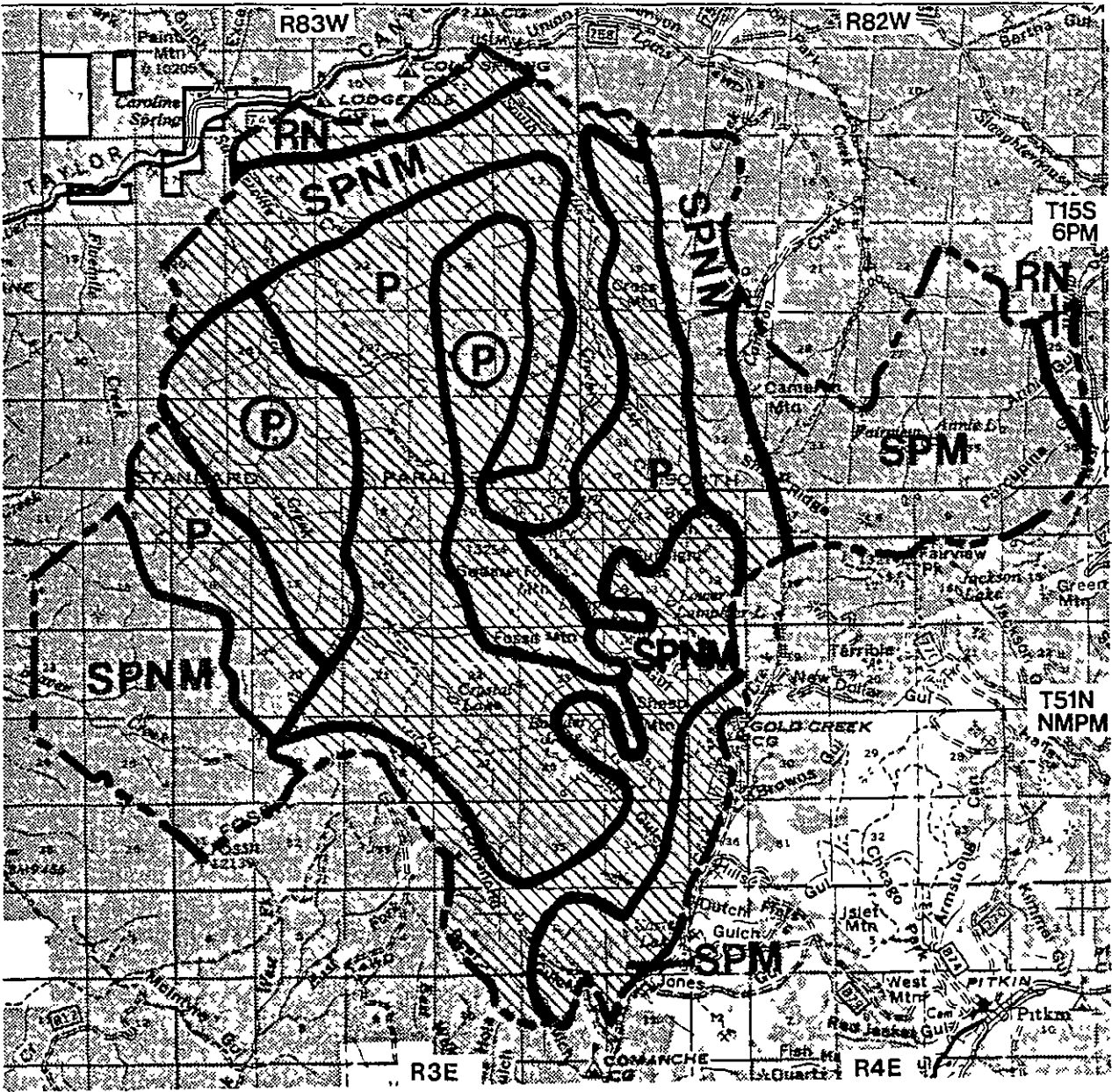
ROS Class	Alternative							
	A		B		C		D	
	Acres	PAOT*	Acres	PAOT*	Acres	PAOT*	Acres	PAOT*
Roaded Natural	1,315	189	0	0	0	0	1,315	189
Semi-Primitive								
Motorized	21,687	376	13,100	82	0	0	24,969	433
Non-Motorized	24,398	156	8,476	95	13,327	135	21,116	135
High Density	0	0	1,920	149	2,085	162	0	0
Primitive	0	0	16,037	107	15,698	88	0	0
Pristine	0	0	7,867	20	16,290	38	0	0
TOTAL	47,400	721	47,400	453	47,400	423	47,400	757

* PAOT = Persons-At-One-Time

Recreation capacities are calculated based on management emphasis. Some minor differences may exist between actual site situation and the management area emphasis. Most of the differences are along the management area boundaries and may indicate a conflict of recreation uses on adjacent management areas.

FIGURE IV-1.

RECREATION OPPORTUNITY SPECTRUM
FOSSIL RIDGE WILDERNESS STUDY AREA
(Alternative B)



Wilderness Study Area Boundary

RN = Roaded Natural
SPM = Semi-Primitive
Motorized
SPNM = Semi-Primitive
Non-Motorized

P = Primitive
(P) = Pristine



Area Suitable in
Alternative B

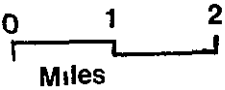
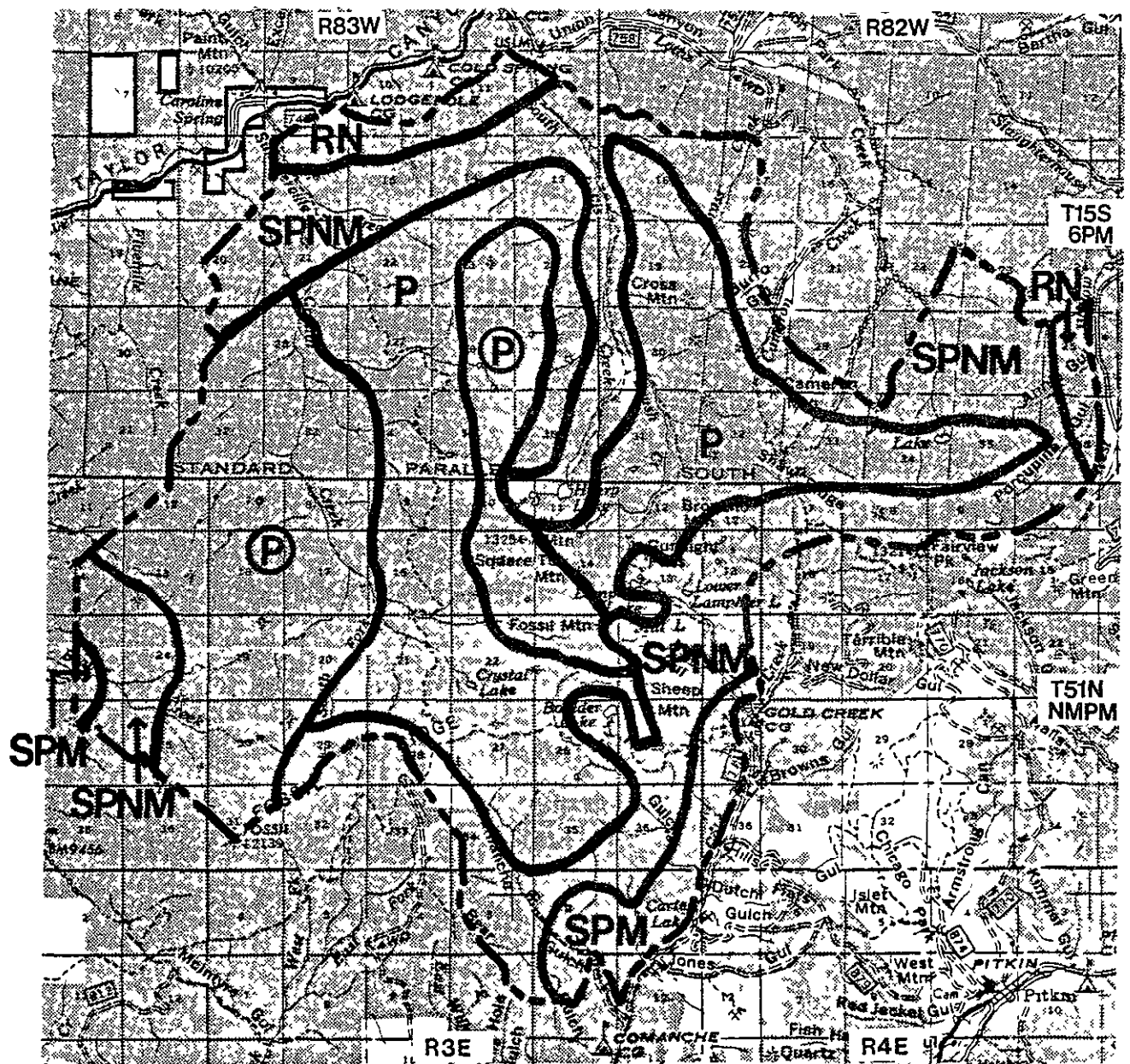



FIGURE IV-2.

RECREATION OPPORTUNITY SPECTRUM
FOSSIL RIDGE WILDERNESS STUDY AREA
(Alternative C)



 Wilderness Study Area Boundary

RN = Roaded Natural
SPM = Semi-Primitive
Motorized
SPNM = Semi-Primitive
Non-Motorized

P = Primitive
Ⓟ = Pristine

0 1 2
Miles


North

--

No developed recreation facilities exist within the WSA. None of the alternatives will add developed recreation facilities.

Under the unsuitable no-action Alternative A, the WSA continues to emphasize management for semi-primitive motorized and semi-primitive non-motorized recreation. Narcissos Charnell feels that; "the Fossil Ridge lakes are the last vestige of non-motorized accessibility in the Taylor area. They offer an outlet for us that prefers a wilderness area". Currently motorized use is permitted on trails. Motorbike use would continue to be permitted. However, it would be limited as in the current situation by rocks, switchbacks and other natural barriers. Budgeting for trail construction and reconstruction would most likely continue to be sporadic in Alternative A. Some reconstruction would take place between 1995 and 2000. The top trail reconstruction priority would be South Lottis. A semi-primitive non-motorized setting would be maintained in the areas between the trails. Semi-primitive non-motorized use would take place in this area and on the trail system. The area will provide 33,556 RVD's annually and still meet the desired recreation experience and protect resource values.

In alternative C, the WSA would be managed to emphasize primitive and pristine wilderness. Control would be necessary in heavy use areas to meet user expectations for primitive and pristine wilderness experiences. Present motorized use would be eliminated. Some trail reconstruction would take place after 1995 and before the year 2000. The top trail reconstruction priority would be South Lottis.

Under the partially suitable for wilderness Alternative B, the WSA would be managed to emphasize primitive and pristine wilderness in the suitable portion and semi-primitive motorized recreation in the unsuitable portion. Control would be necessary in heavy use areas to meet user expectations for primitive and pristine wilderness. Motorized use would be eliminated in the portion suitable for wilderness. Trail reconstruction would be scheduled for the following trails between 1991 and 1995: #428 - South Lottis, #427 - Gold Creek, #428.1 - South Lottis, and #430 - Summerville.

Under the Proposed Action Alternative D, the WSA would be managed to emphasize semi-primitive non-motorized and semi-primitive motorized recreation. Motorbike use of the WSA would continue on trails. However, it would be limited as is the current situation by rocks, switchbacks, and other natural barriers. Trail reconstruction would be scheduled for four trails between 1991 and 1995: #428 - South Lottis, #427 - Gold Creek, #428.1 - South Lottis, and #430 - Summerville. A semi-primitive non-motorized setting would be maintained in the areas between the trails.

In Alternatives A, B and C there would be no significant impacts on the recreation resource. Natural succession would be the dominant course of change for WSA. In Alternative D, vegetation treatment activities could impact the WSA.

Vegetation treatments in Alternative D could reduce the quality of the semi-primitive non-motorized recreation experience. Vegetation activities could increase the quality of the semi-primitive motorized recreation experience. Roads built into the WSA in Alternative D could disperse recreationists seeking a motorized experience. Treatments could reduce the visual quality of the WSA. These visual quality reductions would be short-term. Vegetation treatment poses

the greatest potential for disturbance of cultural resources. At the same time, appropriate survey and mitigation provides the greatest opportunity for cultural resource recognition, preservation and development for public benefit. Cultural resource discovery, however, is predicted to be low for the WSA. Roads built into the WSA in Alternative D, could have the positive effect of increasing seen area for certain publics who would not have the opportunity to view or access the WSA without a road. Outfitter and guide operations could be impacted by vegetation treatments in Alternative D. Outfitter and guides use the WSA. Mitigations of the impacts associated with vegetation treatments in Alternative D would be provided by the management requirements in the Forest Plan. In Alternative D over the 50-year planning horizon*for the WSA, the only vegetation treatment scheduled is timber harvest.

The impacts on the recreation resource from mineral exploration and development are displayed in the Minerals section of this chapter.

Cannibal Plateau Further Planning Area

Recreation related impacts in Cannibal Plateau Further Planning Area are also dispersed in nature.

Table IV-9 displays dispersed recreation capacity by recreation opportunity spectrum (ROS) class and alternative. Figure IV-3 displays ROS classes for Alternative B. Figure IV-4 displays ROS classes for Alternative C. The ROS classes for Alternatives A and D are displayed in Chapter III Wilderness section.

TABLE IV-9.

DISPERSED RECREATION CAPACITY CANNIBAL PLATEAU FURTHER PLANNING AREA

ROS Class	Alternative							
	A		B		C		D	
	Acres	PAOT*	Acres	PAOT*	Acres	PAOT*	Acres	PAOT*
Roaded Natural	0	0	0	0	0	0	489	99
Semi-Primitive								
Motorized	30,503	516	18,391	188	0	0	29,068	492
Non-Motorized	1,487	23	4,596	71	15,871	226	2,433	38
High Density	0	0	0	0	1,036	119	0	0
Primitive	0	0	7,280	54	13,464	60	0	0
Pristine	0	0	1,723	6	1,619	5	0	0
TOTAL	31,990	539	31,990	319	31,990	410	31,990	629

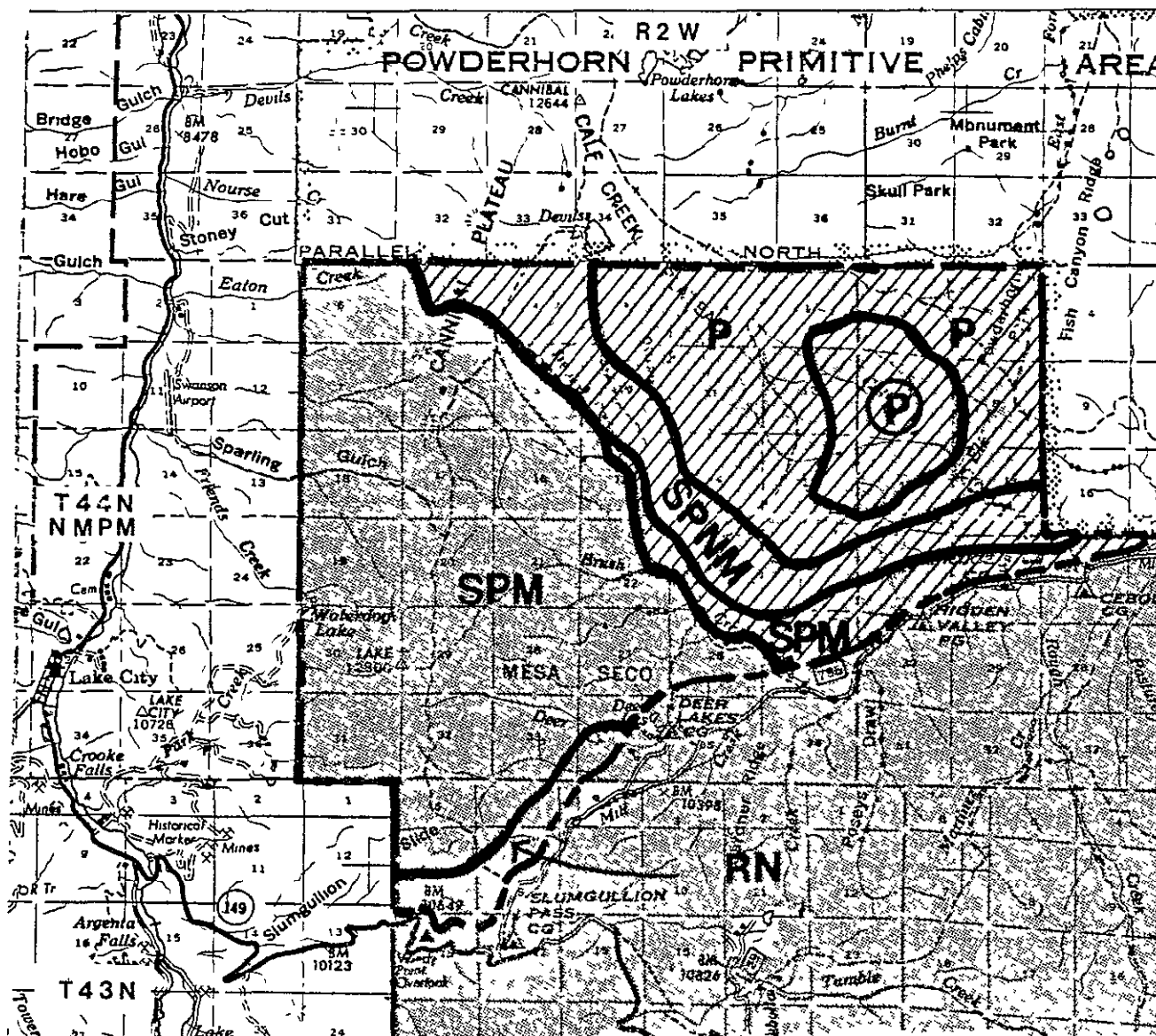
* PAOT = People-At-One-Time

Recreation capacities are calculated based on management area emphasis. Some minor differences may exist between actual site situation and the management area emphasis. Most of the differences are along the management area boundaries and may indicate a conflict of recreation uses on adjacent management areas.

Table IV-10 displays recreation use capacity by alternative for the FPA.

FIGURE IV-3.

RECREATION OPPORTUNITY SPECTRUM
CANNIBAL PLATEAU FURTHER PLANNING AREA
(Alternative B)



Further Planning Area Boundary

RN = Roaded Natural
SPM = Semi-Primitive
Motorized
SPNM = Semi-Primitive
Non-Motorized

P = Primitive
P = Pristine

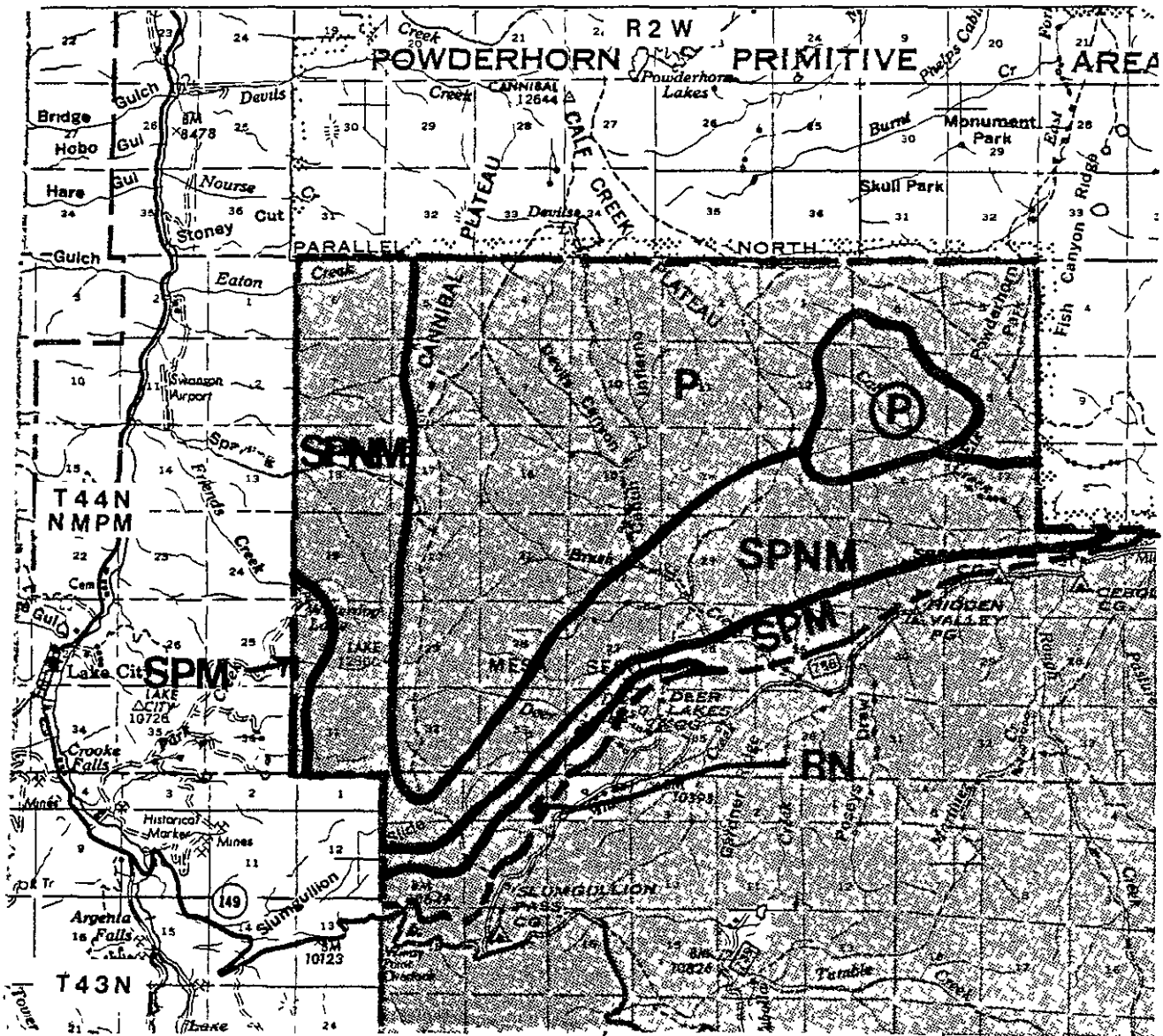


Area Suitable in
Alternative B



FIGURE IV-4.

RECREATION OPPORTUNITY SPECTRUM
CANNIBAL PLATEAU FURTHER PLANNING AREA
(Alternative C)



Further Planning Area Boundary

RN = Roaded Natural
SPM = Semi-Primitive
Motorized
SPNM = Semi-Primitive
Non-Motorized

P = Primitive
Ⓟ = Pristine

0 1 2
Miles



North

TABLE IV-10.

TOTAL RECREATION CAPACITY
CANNIBAL PLATEAU FURTHER PLANNING AREA
(Recreation Visitor Days)

Alternative	Dispersed Day Capacity	Camping Capacity	Total
A	30,647	13,757	44,404
B	16,497	8,881	25,378
C	13,992	7,219	21,211
D	35,764	16,045	51,818

No developed facilities exist within the FPA. None of the alternatives will add developed recreation facilities.

Under the unsuitable no-action Alternative A, the FPA continues to be managed for semi-primitive motorized recreation. The FPA would provide 44,404 RVD's annually and still meet the desired recreation experience and protect resource values. Budgeting for trail construction and reconstruction would most likely continue to be sporadic. Trail vehicle use would continue along designated trails. Snowmobiling could continue in areas of the FPA suited to this use.

Under alternative B, the Proposed Action, the FPA would be managed to emphasize primitive and pristine wilderness in the suitable portion and semi-primitive motorized recreation in the unsuitable portion. Control would be necessary in heavy use areas to meet user expectations for primitive and pristine wilderness. Motorized use would be eliminated in the portion suitable for wilderness. Trail reconstruction would be scheduled for Rough Creek #463 for the period 1991 to 1995.

In alternative C, the FPA would be managed to emphasize primitive and pristine wilderness. Control would be necessary in heavy use areas to meet user expectations for primitive and pristine wilderness experiences. Present motorized use would be eliminated. Some trail reconstruction would take place after 1990.

Under the unsuitable Alternative D, the FPA would be managed to emphasize semi-primitive motorized and non-motorized recreation. Past motorbike use of the area would continue on trails. Trail reconstruction would likely occur after 2010.

In Alternatives A, B and C there would be no significant impacts on the recreation resource. Natural succession would be the dominant course of change for FPA. In Alternative D, vegetation treatment activities could impact the FPA.

Vegetation treatments in Alternative D could reduce the quality of the semi-primitive non-motorized recreation experience. Vegetation activities could increase the quality of the semi-primitive motorized recreation experience. Roads built into the FPA in Alternative D could disperse recreationists seeking

a motorized experience. Treatments could reduce the visual quality of the FPA. These visual quality reductions would be short-term. Vegetation treatment poses the greatest potential for disturbance of cultural resources. At the same time, appropriate survey and mitigation provides the greatest opportunity for cultural resource recognition, preservation and development for public benefit. Cultural resource discovery, however, is predicted to be low for the FPA. Roads built into the FPA in Alternative D, could have the positive effect of increasing seen area for certain publics who would not have the opportunity to view or access the FPA without a road. Outfitter and guide operations could be impacted by vegetation treatments in Alternative D. Outfitter and guides use the WSA. Mitigations of the impacts associated with vegetation treatments in Alternative D would be provided by the management requirements in the Forest Plan. In Alternative D over the next ten years for the FPA, the only vegetation treatment scheduled is timber harvest.

The impacts on the recreation resource from mineral exploration and development are displayed in the Minerals section of this chapter.

WILDERNESS

The Forest currently manages 501,777 acres as wilderness. This figure includes the areas added to the National Wilderness Preservation System by the Colorado Wilderness Act.

The alternatives have a different mix of four wilderness management prescriptions. This provides a variety of wilderness environments and experiences. These range from areas with high day-use levels and low solitude opportunities, to low use levels and excellent opportunities for solitude. The land management allocations for the four wilderness prescriptions are displayed in Table IV-1. The wilderness prescriptions are presented in Chapter III of the Plan for all alternatives. All alternatives emphasize primitive wilderness settings. In areas where use exceeds capacity for a particular wilderness setting, a wilderness permit system will be instituted if indirect methods of shifting use are not successful. The present grazing and outfitter uses for the wilderness areas are not altered under the management area direction of any alternative. Under all alternatives, wilderness management will be geared toward natural succession. This will add to the amount of overmature vegetation and increase the potential for insect and disease outbreak and fire.

Wilderness settings are discussed in the Wilderness section, Chapter III. Appendix I displays the estimated wilderness ROS classes (Management Area Direction) by wilderness area.

The 1983 Appropriation Bill, passed by Congress since the Draft EIS was released, prohibits oil and gas leasing in wilderness through September 30, 1983. In addition, the Secretary of Interior has issued a policy statement that he will not approve oil or gas leases in wilderness prior to the time the 1964 Wilderness Act withdraws all wilderness from mineral exploration and development, December 31, 1983. This would preclude any further exploration and development within wilderness subject to valid existing rights. The Secretary's decision, however, is administrative rather than law and could be rescinded at any time. For that reason, oil and gas leasing in wilderness is addressed in this chapter. See the "Minerals" section of this chapter.

Within existing wilderness, there may be changes in recreation opportunity and management prescriptions if lands identified available for oil and gas leasing were actually leased by the Department of Interior. There may be a decrease in wilderness character over time on all acres recommended for leasing if lease offers are received and exploration takes place. The "Minerals" section of this chapter summarizes mineral leasing recommendations for wilderness areas by alternative. Wilderness character could decrease in all alternatives except Alternative 2. Appendix I displays land recommended available for mineral leasing for the five wilderness areas. Roads related to mineral exploration and development would cause the greatest detriment to wilderness character. Any road construction allowed in wilderness would be of minimum standard required for access and would be located and scheduled to minimize disturbance to resources and wilderness users. Road construction and reconstruction is displayed in the Plan, Chapter III, Forest Direction, under the "Minerals" management activity.

Wilderness demand will increase in all alternatives. Each alternative will meet projected demand for wilderness use. Wilderness capacity increases in alternatives 1, 4, 6, 7 and 8. Alternatives 1, 4, 6, 7 and 8 identify all or portions of Cannibal Plateau Further Planning Area and/or Fossil Ridge Wilderness Study Area suitable for inclusion in the National Wilderness Preservation System.

The Cannibal Plateau Further Planning Area and the Fossil Ridge Wilderness Study Area were evaluated for their suitability for inclusion in the National Wilderness Preservation System. The evaluation was based on capability, availability, and need for wilderness.

The existing wilderness acres covered in this Final EIS are displayed in Chapter I. The two areas eligible for wilderness suitability analysis are Fossil Ridge Wilderness Study Area (47,400 acres) and Cannibal Plateau Further Planning Area (31,990 acres). Table IV-11 displays the wilderness and wilderness suitability analysis by alternative.

TABLE IV-11.

WILDERNESS MANAGEMENT
(National Forest System Acres)

Alternative	Existing Wilderness	Cannibal Plateau Further Planning Area	Fossil Ridge Wilderness Study Area	Total
1	453,618	13,599	0	467,217
2	453,618	0	0	453,618
3	453,618	0	0	453,618
4	453,618	31,990	47,400	533,008
5	453,618	0	0	453,618
6	453,618	13,599	34,300	501,517
7	453,618	31,990	47,400	533,008
8	453,618	13,599	0	467,217
9	453,618	0	0	453,618

The environmental consequence analysis for Fossil Ridge and Cannibal Plateau is made as part of the nine alternatives considered in detail. The analysis is documented throughout the environmental consequences discussions in this chapter. Appendix I summarizes the values foregone for Cannibal Plateau Further Planning Area and Fossil Ridge Wilderness Study Area. Appendices K and L index Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area.

The following discussion displays the entire wilderness suitability analysis for Cannibal Plateau Further Planning Area and Fossil Ridge Wilderness Study Area. Suitability recommendation requires that an area be capable, available, and needed for wilderness. The four alternatives considered for both areas are suitable (No Action - A), partially suitable (B), unsuitable (C), and suitable (D).

Fossil Ridge Wilderness Study Area Suitability Or Unsuitability Analysis

Standards to be met by components of the National Wilderness Preservation System (NWPS) were established in the Wilderness Act of 1964. Forest Service policy requires Capability, Availability, and Need for wilderness be analyzed prior to determining the suitability or unsuitability of an area for inclusion in the NWPS. These three criteria are discussed below.

WILDERNESS CAPABILITY

In RARE II, the Fossil Ridge area was identified the Crystal Creek Roadless Area. The WARS rating for Crystal Creek was 24. The current WARS rating for Fossil Ridge is 25. This higher rating reflects an improvement in the rating of natural integrity that resulted from the boundary change from Crystal Creek to Fossil Ridge. The WAR's rating for Alternative B is 26, which again is due to improved natural integrity. Table IV-12 displays these WARS ratings. The ratings are related to wilderness study attributes for specific areas proposed for wilderness study and not the four WSA alternatives.

TABLE IV-12.

WILDERNESS ATTRIBUTE RATING SUMMARY

Wilderness Attribute	Crystal Creek Roadless Areas	Fossil Ridge WSA	Fossil Ridge WSA Partial Suitable (Alt. B)
Influence on Natural Integrity	4	5	6
Influence on Apparent Naturalness	5	5	5
Solitude Opportunity	6	6	6
Primitive Recreation Opportunity	6	6	6
Composite WARS Rating	21	22	23
Supplementary Wilderness Attributes	3	3	3
<u>TOTAL</u>	<u>24</u>	<u>25</u>	<u>26</u>

The Fossil Ridge Wilderness Study Area is manageable as wilderness. The most uncertain aspect of manageability involves future minerals resource exploration and development. The following criteria are used as indicators of manageability:

Ability to Manage the Area as an Enduring Resource of Wilderness and to Protect and Manage its Natural Character

The WSA's current wilderness character can be maintained until Congress acts. Vegetation treatments occurring in Alternative D will not be permitted until Congress acts. The WSA's wilderness character would probably not be maintained if mineral exploration and development occurred. Impact on wilderness character from mineral exploration and development will be analyzed through the Environmental Analysis process as operating plans are received. Mitigation measures ensure the land's characteristics would be rehabilitated but not restored.

Size and Shape of the Area

The entire Fossil Ridge Wilderness Study Area contains 47,400 acres and is relatively compact. The WSA boundary is determined by non-conforming roads in most places rather than topographic features. The WSA is a sufficient size and shape to be managed wilderness.

The partial suitable alternative B cuts off 13,100 acres on the east and west sides. This moves the boundary to prominent ridges which makes the remaining 34,300 acre area very compact and easier to locate on the ground.

Location Relative to External Influences

Mineral exploration is active near the east boundary for gold and on the south boundary for limestone. The limestone patented claim owners (Colorado Mineral Corporation) feel they have sufficient quality and quantity to proceed with development. Development could start in 1983. No operation plans have been received by the Forest.

The north boundary is adjacent to the Taylor Canyon road. Traffic on the road has little or no impact because of topographic and vegetative screening.

The partially suitable alternative B would not be any different in its location relative to external influences than the situation for the total WSA.

U.S. Highway 50 is far enough away from the WSA that it has no affect on the WSA.

Boundaries

The following criteria were analyzed pertaining to boundaries for Fossil Ridge and the alternatives considered in detail. Alternatives A, C and D boundaries were determined by the 1980 Colorado Wilderness Act. The alternative B boundary was determined by the Forest management team.

- Boundaries should avoid conflict with important existing or potential public uses.
- Boundaries should be readily and accurately described.
- Boundaries should utilize features that constitute a barrier to prohibited use and act as a shield to protect wilderness environment.
- Boundaries should provide an opportunity for transportation access and trailheads.

Boundaries can be readily and accurately described under the suitable and partially suitable alternative to avoid conflict with important existing or potential public uses. Boundaries can utilize features that constitute a barrier to prohibited use and act as a shield to protect wilderness environment. They can provide an opportunity for transportation access and trailheads. The southern boundary for the suitable alternatives B and C potentially conflicts with limestone mining development. Boundary adjustment in that area would eliminate the conflict.

Summary

The capability rating for the total Fossil Ridge Wilderness Study Area and the partial suitable alternative is high. From a capability standpoint, the WSA is suitable for wilderness. Of Alternatives B and C, the partial suitable Alternative B has the most manageable boundary.

WILDERNESS AVAILABILITY

Value Comparison

Availability of an area for wilderness is determined, in part, by a comparison of the value and need for the wilderness resource with the value and need for other resources. The values of the wilderness resource, both tangible and intangible, should be greater than the values foregone. However, the highest and best use of an area for wilderness in economic terms is difficult to assess because of the difficulty of establishing and agreeing upon monetary values for the intangible wilderness benefits.

Wilderness values in the Fossil Ridge Wilderness Study Area include:

- The potential to provide the opportunity for a wilderness recreation experience to 423 persons at one time (PAOT) under Alternative C and 453 PAOT under Alternative B.
- A degree of protection to natural ecosystems, wildlife, water quality, and other resources. Rosalind McCellan of the Colorado Wilderness Network feels: "Fossil Ridge's values as a scientific resource, its abundant wildlife and its fragile tundra ecosystem are considerably underrated".

The WSA currently includes 31,781 forested acres. These acres are capable, but not available for timber production. If it was available for timber production, an estimated .242 MMBF could be harvested annually. There are sufficient opportunities to harvest timber outside the WSA to meet foreseeable

needs of local industry for the next 50 years. Because of the rugged topography, as well as the scattered nature of timber stands over the WSA's middle portion, timber management would be expensive. Under Alternative D, 3,415 acres of suitable timberland with 17.811 MMBF would be scheduled for harvest through year 2030. No timber harvest is scheduled for Alternatives A, B and C.

Rosalind McCellan of the Colorado Wilderness Network, Roger and Kathy Cox of the Colorado Bicycle Tours, and others feel that, "Mineral values receive too much emphasis in determining availability." Pauline D. Plaza for the National Audubon Society and Dick Wingerson for the High Country Citizen Alliance feel that, "There is no evidence that mineral resources in Fossil Ridge WSA are present in quantities that would justify substantial monetary investment, or that there is a demand for these resources - certainly the report contains no such information (the Mt. Emmons delay is not even mentioned)."

Forest Service Handbook 1909.12 states that highly mineralized areas that would require restrictions or controls to maintain the wilderness character of the land are considered not to be in the public interest and may be reason to consider an area unavailable for wilderness.

Potential mineral values are in direct conflict with wilderness values in the Fossil Ridge WSA. There is high potential for locatable minerals including molybdenum, uranium, limestone, gold, and silver. Currently there are no mineral deposit discoveries. Available evidence indicates a high likelihood of significant economic value.

Little subsurface exploration has occurred. Mineral extent and value can only be determined through intensive exploration. The unsuitable alternatives A and D would allow exploration with mitigation. The suitable alternatives (B and C) place additional constraints on exploration, increasing both direct costs and risks to the prospector or company. With the suitable alternatives, there is also an increased possibility that a significant discovery may be foregone due to the 1983 mineral withdrawal date in the 1964 Wilderness Act.

Although recreation would constitute a major use of the WSA under Alternative C, the type of recreation by its nature has a higher unit value (\$8.00 per RVD) and a lower capacity than would be the case under Alternatives A, B, or D. However, the lower capacity is not significant enough to offset the lower unit values (\$3.00 per RVD) for Alternatives A, B, and D. The recreation value foregone under Alternative C is therefore 0 per year.

Rosalind McCellan of the Colorado Wilderness Network, Clifton R. Merritt of the American Wilderness Alliance, and Kathryn L. Hoffman commented, "Colorado State University, Department of Economics and the American Wilderness Alliance have completed a study quantifying the economic value of wilderness. The Forest Service should use this report in the Suitability Analysis for Fossil Ridge (Walsh-Loomis Study - 1981)."

The value assigned to wilderness (\$8.00 in 1978, \$11.21 in current value) is assigned as a result of the 1980 RPA planning effort. Variations in this value require Regional Office direction.

All semi-primitive motorized opportunities would be lost under Alternative C and almost all (84 percent) under Alternative B.

Alternatives B and C would preclude projects designed to increase water yield in the WSA. Currently, however, the values of additional water are small and the need for such increases is not established. The suitable alternatives will also increase the difficulty of constructing water storage facilities in the WSA, though there are currently no proposals to do so.

Wilderness characteristics could be lost in alternative A and the unsuitable portion of alternative B. Wilderness characteristics will be lost in alternative D.

Existing Constraints and Encumbrances

There are 465 acres of patented mining claims in the WSA. All other land is in National Forest System management. The Forest Service has no direct control over activities on the patented mining claims. Reasonable access would have to be provided through National Forest System land if the private land was developed.

About 25% of the WSA is covered by unpatented mining claims. Activities on the claims is governed by the 36 CFR 228 regulations. Mineral exploration and development could reduce wilderness values.

Effect of Wilderness Designation and Management on Adjacent Land

No transportation or utility corridors are proposed through the WSA. Trail-head and access facilities would be similar if the WSA is suitable or unsuitable for wilderness. There would be no anticipated adverse effects of wilderness designation on the management of adjacent land.

Summary

The Fossil Ridge Wilderness Study Area is unsuitable for wilderness using the availability criteria. Norm Mullen and others of the Colorado Open Space Council and the Wilderness Society feel: "We disagree with the Forest's rejection of the area as "unavailable" for designation. We have seen no indication that benefits from non-wilderness status will outweigh benefits from wilderness designation."

Values foregone are greatest with respect to minerals considering either Alternative B or C.

The high mineral potential makes Fossil Ridge Wilderness Study Area unavailable and unsuitable for wilderness.

WILDERNESS NEED

Considering that land in the National Wilderness Preservation System serves a variety of users, including national and regional publics, no clear statement can be made concerning what constitutes sufficient wilderness land area.

However, an analysis of present and anticipated use levels on wilderness and other areas in the vicinity having similar landform and ecosystem characteristics gives an indication of relative need.

M. Rupert Cutler for the National Audubon Society, Kirk Cunningham for Enos Mills Group Sierra Club and a number of others feel, "The 'need' from a national perspective is not considered."

The RARE II EIS dealt with "wilderness need" on a National basis. It included extensive public involvement. This analysis considers the current or future public need for additional wilderness on the Forest.

In considering the need for wilderness, certain assumptions were made:

- Visitors to wilderness will increase with both an increasing population and a growing wilderness awareness.
- Some undeveloped land provides opportunities for a primitive type of recreation outside wilderness.
- Some visitor use which occurs in wilderness is not dependent upon the wilderness environment.
- Within social and biological limits, management may increase existing wilderness capacity to support human use without unacceptable wilderness resource depreciation.
- Threatened, endangered, unusual, or unique biotic associations may exist nowhere else, or be extremely limited outside an area studied for wilderness. The need for perpetuation of these values must be considered.
- Some biotic species and/or associations may require a wilderness environment for survival.

The following factors were considered in determining whether the Fossil Ridge WSA is needed for wilderness:

Location, Size, and Type of Other Wildernesses in the General Vicinity and Their Distance from the Study Area

There is 739,500 acres of wilderness within a 50-mile radius, 2,136,000 acres within 100-mile radius and 2,582,400 acres within 150-mile radius of the WSA. Chapter III, Wilderness, displays Fossil Ridge in relationship to the wilderness areas on the Forest.

Present Visitor Pressure on Other Wildernesses, Trends in Use, and Changing Patterns of Use

Demand for and use on wilderness areas is expected to increase in the immediate future. Trends indicate that individuals and families will tend to spend more of their vacation time in one location rather than traveling to several areas. Wilderness trips provide an opportunity to experience the outdoors in

a natural setting, along with a unique type of challenge not available in urban areas. More people are realizing this, and wilderness visits are expected to increase accordingly. Increases in leisure time as well as a growing national awareness of environmental matters will influence this trend as well.

Use in 1981 for wildernesses on the Forest is summarized in Table IV-13. Recreation Visitor Days (RVD's) and National Forest System (NFS) acres are for the total wilderness areas. The Forest's portion is included in the totals.

TABLE IV-13.

WILDERNESS USE

Wilderness	Total RVD's	Net NFS Acres	RVD/AC/ Year	Relative Use Rating**
Raggeds	19,000	59,105	0.32	Low
Maroon Bells-Snowmass	211,300	179,042	1.18*	High
Collegiate Peaks	144,300	166,638	0.87	High
West Elk	57,000	176,092	0.32	Low
La Garita	32,300	103,986	0.31	Low
Big Blue	53,500	97,350	0.55	Moderate
Mt. Sneffels	11,100	16,200	0.69	Moderate
Lizard Head	28,200	41,158	0.69	Moderate
<u>TOTAL</u>	<u>556,700</u>	<u>840,456</u>	<u>0.66</u>	<u>Moderate</u>

* The Environmental Assessment for the Interim Management Direction for the Maroon Bells - Snowmass Wilderness states that more than 80% of all visitors enter through the West Maroon or Snowmass Trail-heads north of the wilderness out of Aspen. Use originating on the Gunnison County side is much lighter.

**Relative Use Ratings Based on:

0-.35	Recreation Visitor Days/Acre/Year	Low
.36-.70	Recreation Visitor Days/Acre/Year	Moderate
.70+	Recreation Visitor Days/Acre/Year	High

Lands' Ability to Provide Opportunities for Unconfined Outdoor Recreation Experiences Outside a Wilderness Setting

The Fossil Ridge WSA has high potential to provide opportunities for unconfined outdoor recreation experiences. The rugged terrain combined with abundant vegetative screening away from travel routes suggests that the WSA will have considerable primitive experience capability regardless of suitability or unsuitability for wilderness.

This capability is also not in short supply in the surrounding area.

Ability of Plant and Animal Species to Compete with People and Projects

No Federally or State-designated threatened or endangered plants or animals are known to exist in the WSA. Natural ecological forces will continue relatively undisturbed under all alternatives. Plant and animal species native to the WSA will be maintained under all alternatives.

The Need to Provide Sanctuary for Species that Have Demonstrated an Inability to Survive in Less Primitive Surroundings

No biotic species have been identified that require a wilderness environment for survival.

Provide for Preservation of Unique Landform Types and Ecosystems

Tables IV-14 and IV-15 compare landform types and ecosystems present in the Fossil Ridge Wilderness Study Area with those found in nearby existing wildernesses. There are no unique landforms or ecosystems in Fossil Ridge WSA that are not currently represented in other wilderness areas.

TABLE IV-14.

COMPARISON OF ECOLOGICAL UNITS (Fossil Ridge Wilderness Study Area and Surrounding Wilderness)

Plant Series	Wilderness or Wilderness Study Area*				
	Fossil Ridge	West Elk	Maroon Bells-Snowmass	Collegiate Peaks	Raggeds
Alpine Dryad-Sedge	C	C	C	C	E
Alpine Shrubs, Grasses and Forbs (35-85% slope)	C	C	C	C	C
Subalpine Fir, Engelmann Spruce, and Aspen (30%+ Slope)	C	E	U	C	C

*E = Extensive type covers one half or more of the area.

C = Common type covers more than 10% but less than 50%.

U = Uncommon type is found in area but covers less than 10%.

TABLE IV-15.

LANDFORM FREQUENCY COMPARISON
(Fossil Ridge Wilderness Study Area and Surrounding Wildernesses)

Landform Types	Wilderness or Wilderness Study Area*				
	Fossil Ridge	West Elk	Maroon Bells-Snowmass	Collegiate Peaks	Raggeds
A. Glacial					
1. Erosional					
cirques	E	U	E	E	C
horns	C	U	C	C	U
aretes	E	U	E	E	C
tarns	C	U	E	E	C
U-shaped valleys	E	U	E	E	C
hanging valleys	E	U	E	E	C
truncated spurs	C	U	E	E	U
scoured basins	E	U	E	E	U
B. Colluvial					
1. Erosional wasting					
slopes/cliffs	C	C	C	C	C
2. Depositional talus					
slopes	C	C	C	C	C
C. Alluvial					
1. Erosional V-shaped					
valleys	U	E	U	U	E
2. Depositional					
floodplains	C	E	C	C	E

* E = Extensive

C = Common

U = Uncommon

Summary

The six factors used in the need analysis indicate the WSA is not needed for wilderness. These factors were:

- Other wildernesses in vicinity;
- Visitor pressure and trends in the other wildernesses;
- WSA ability to provide unconfined recreation opportunities outside a wilderness setting;
- Protection needed for biotic species;
- Need to provide sanctuary for species; and
- Protect unique landforms and ecosystems.

The Fossil Ridge WSA is unsuitable for wilderness using the need criteria.

Cannibal Plateau Further Planning Area Suitability Or Unsuitability Analysis

Standards to be met by components of the National Wilderness Preservation System (NWPS) were established in the Wilderness Act of 1964. Forest Service policy requires Capability, Availability, and Need for wilderness be analyzed prior to determining the suitability or unsuitability of an area for inclusion in the NWPS. These three criteria are discussed below.

WILDERNESS CAPABILITY

In RARE II, the WARS rating for Cannibal Plateau FPA was 22. The current WARS rating for Cannibal Plateau is 22. The WARS rating for Alternative B is 23. Table IV-16 displays the WARS ratings.

TABLE IV-16.

WILDERNESS ATTRIBUTE RATING SUMMARY

Wilderness Attribute	Cannibal Plateau FPA	Cannibal Plateau FPA Partial Suitable
Influence on Natural Integrity	4	5
Influence on Apparent Naturalness	6	6
Solitude Opportunity	5	5
Primitive Recreation Opportunity	6	6
Composite WARS Rating	<u>21</u>	<u>22</u>
Supplementary Wilderness Attributes	1	1
<u>TOTAL</u>	<u>22</u>	<u>23</u>

The Cannibal Plateau Further Planning Area is manageable as wilderness. The north boundary is adjacent to the BLM's Powderhorn Primitive Area, which has been identified suitable for wilderness. The Cebolla-Los Pinos Road forms the

south boundary. Boundaries can be described to avoid conflict with existing and potential public uses, protect the wilderness environment, and provide an opportunity for access and trailheads. The west boundary between public and private land is difficult to control. The north and east boundaries adjoin the Powderhorn Primitive Area.

Ability to Manage the Area as an Enduring Resource of Wilderness and to Protect and Manage its Natural Character

The FPA's current wilderness character could be maintained until Congress acts. This is not a requirement of the Colorado Wilderness Act. However, a waiting period of 90 days is necessary while Congress is in session before the portion of the decision which directly affects the FPA can be implemented. Vegetation treatments occurring in alternative D would not be permitted until after the 90 day waiting period elapsed. After the 90 day waiting period in alternative D, the wilderness character of the FPA would not be maintained.

The FPA's wilderness character would probably not be maintained if mineral exploration and development occurred. Impact on wilderness character from mineral exploration and development will be analyzed through the Environmental Analysis process as operating plans are received. Mitigation measures ensure the land's characteristics would be rehabilitated but not restored.

Size and Shape of the Area

Alternative B, contains 13,599 acres; Alternative C, contains 31,990 acres. While both alternatives are fairly compact, they are of sufficient size and shape to be managed as wilderness.

Location Relative to External Influences

The south boundary of both suitable alternatives is adjacent to the Cebolla-Los Pinos Road. Traffic on the road has little or no impact. There are no known or anticipated external impacts that have any significance.

Boundaries

The following criteria were analyzed pertaining to boundaries for Cannibal Plateau and the alternatives considered in detail. Alternative C boundary is from the RARE II Final EIS. The Alternative B boundary was determined by the Forest management team considering input from the BLM.

- Boundaries should avoid conflict with important existing or potential public uses.
- Boundaries should be readily and accurately described.
- Boundaries should utilize features that constitute a barrier to prohibited use and act as a shield to protect wilderness environment.
- Boundaries should provide an opportunity for transportation access and trailheads.

The suitable Alternative C conflicts with an existing electronic site. The site provides television reception to the Lake City area. The suitable alternative potentially conflicts with some dispersed motorized recreation in the Lake City area.

Under the suitable Alternatives B and C, a setback from the Cebolla-Los Pinos Road would form the south boundary. The west boundary between public and private land would be difficult to locate, post, and control in the suitable alternative (C). The north and east boundary would adjoin the recommended Powderhorn Wilderness in Alternative B and C. Each alternative provides an opportunity for transportation access and trailheads.

Summary

The capability rating for the Cannibal Plateau Further Planning Area is high. From a capability standpoint, the FPA is suitable for wilderness. The suitable alternatives are preferable.

WILDERNESS AVAILABILITY

Value Comparison

Availability of an area for wilderness is determined, in part, by a comparison of the value and need for the wilderness resource with the value and need for other resources. The values of the wilderness resource, both tangible and intangible, should be greater than the values foregone. However, the highest and best use of an area for wilderness in economic terms is difficult to assess because of the difficulty of establishing and agreeing upon monetary values for the intangible wilderness benefits.

Wilderness values in the Cannibal Plateau Further Planning Area include:

--The potential to provide the opportunity for a wilderness recreation experience to 410 persons at one time (PAOT) under Alternative C and to 131 PAOT under Alternative B.

--A degree of protection to natural ecosystems, wildlife, water quality, and other resources under both suitable alternatives.

Interest is high in the recreation resource. Snowmobiling conflicts with the wilderness values in the western half of the FPA. High potential for snowmobile use occurs in that area. The unsuitable Alternatives A and D and the unsuitable portion of Alternative B will allow this use to continue, although snowmobiling would be somewhat reduced under the partial suitable alternative. Alternative C will stop all snowmobiling. Snowmobiling has few adverse impacts on the environment. Snowmobiling can affect winter dispersed non-motorized recreation activities. Prohibiting snowmobile use will reduce opportunities for winter dispersed motorized recreation in the Lake City area.

Although recreation would constitute a major use of the FPA under Alternative C, the type of recreation by its nature has a higher unit value (\$8.00 per RVD) and a lower capacity than would be the case under Alternative A, B or D. However, the lower capacity is not significant enough to offset the lower unit values (\$3.00 per RVD) for Alternative A, B and D. The recreation value foregone under Alternative C is therefore 0 per year.

There are no patented and 2 unpatented mining claims in the FPA. The area has very low potential for locatable minerals, and extremely low potential for oil and gas.

Current recreation use is 8% of the area's capacity under the suitable Alternative C and 7% of the area's capacity under the partial suitable Alternative B. Current recreation use is 3% of the area's capacity under the unsuitable Alternative D, 4% of the area's capacity under Alternative A.

The suitable alternative C would eliminate a potential timber harvest of 109.9 million board feet (MMBF) through the year 2030. Alternative D reschedules this harvest while Alternatives A, B and C do not. Elimination of such a minor amount of potential timber harvest will not affect the local timber industry.

Alternatives B and C would preclude projects designed to increase water yield in the FPA. Currently, however, the values of additional water are small and the need for such increases is not established. The suitable alternatives will also increase the difficulty of constructing water storage facilities in the FPA, although there are currently no proposals to do so.

Existing Constraints and Encumbrances

All land in the FPA is National Forest System land administered by the Forest.

There are 2 unpatented mining claims in the FPA. Activities on the claims is governed by the 36 CFR 228 regulations. Mineral exploration and development could reduce wilderness values.

There are two special use permits in the FPA. One permit is for water storage and diversion at Waterdog Lake. The other permit is for an electronic site on Cannibal Plateau. This site requires year-round maintenance and is accessible via a four-wheel drive trail in summer and snowmobile in winter. Alternatives A, B and D will not affect the special use permits. The electronic site special use permit will be canceled if the entire FPA is suitable for wilderness. The affected area will need to be restored at a large expense. The water storage and diversion special use is compatible with wilderness.

The Slumgullion Earthflow National Natural Landmark was withdrawn from mineral entry on September 20, 1965. Part of the earthflow is on National Forest System land inside the FPA.

Effect of Wilderness Designation and Management on Adjacent Land

No transportation or utility corridors are proposed through the FPA. Trailhead and access facilities would be similar if the FPA is suitable or unsuitable for wilderness. There would be no anticipated adverse effects of wilderness designation on adjacent land management.

BLM land management problems on the north boundary of the FPA will not exist in Alternatives B or C.

The west boundary is difficult to locate, post, and control with Alternative C.

Summary

The low minerals potential, lack of environmental impacts from snowmobiling, low timber volumes and value, and few encumbrances make the FPA available for wilderness. Wilderness would provide benefits to the adjacent recommended Powderhorn Wilderness. Snowmobiling will be eliminated if the entire FPA is wilderness. The low mineral potential makes mineral exploration and development unlikely.

WILDERNESS NEED

Considering that land in the National Wilderness Preservation System serves a variety of users, including national and regional publics, no clear statement can be made concerning what constitutes sufficient wilderness land area. However, an analysis of present and anticipated use levels on wilderness and other areas in the vicinity having similar landform and ecosystem characteristics gives an indication of relative need.

The Rare II analysis dealt with "wilderness need" on a National basis. It included extensive public involvement. This review considers the current or future public need for additional wilderness on the Forest.

In considering the need for wilderness, certain assumptions were made:

- Visitors to wilderness will increase with both an increasing population and a growing wilderness awareness.
- Some undeveloped land provides opportunities for a primitive type of recreation outside wilderness.
- Some visitor use which occurs in wildernesses is not dependent upon the wilderness environment.
- Within social and biological limits, management may increase existing wilderness capacity to support human use without unacceptable wilderness resource depreciation.
- Threatened, endangered, unusual, or unique biotic associations may exist nowhere else, or be extremely limited outside an area studied for wilderness. The need for perpetuation of these values must be considered.
- Some biotic species and/or associations may require a wilderness environment for survival.

The following factors were considered in determining whether the Cannibal Plateau FPA or a portion of the FPA is needed for wilderness:

Location, Size, and Type of Other Wildernesses in the General Vicinity and Their Distance from the Planning Area

There are 904,700 wilderness acres within a 50-mile radius, 1,699,800 wilderness acres within 100-mile radius, and 1,830,809 wilderness acres within 150-mile radius of Cannibal Plateau FPA. Chapter III, Wilderness displays Cannibal Plateau FPA in relationship to the wilderness areas on the Forest.

Present Visitor Pressure on Other Wildernesses, Trends in Use, and Changing Patterns of Use

Because of the large land area represented by wildernesses on the Forest, as well as the relatively low population density in this part of the west, overall visitor pressure on other wildernesses is relatively low. This can be partially explained by the fact that wilderness recreation experiences, by definition, require low user density per unit area. Therefore, the low visitor pressure on nearby wildernesses can be interpreted to indicate that existing areas are indeed fulfilling their purpose in providing "opportunities for solitude in areas untrammelled by man." But demand for and use on wilderness areas is expected to increase in the immediate future. Trends indicate that individuals and families will tend to spend more of their vacation time in one location rather than on the road.

Wilderness trips provide an opportunity to experience the outdoors in a natural setting, along with a unique type of challenge not available in urban areas. More people are realizing this, and wilderness visits are expected to increase accordingly. Increases in leisure time as well as a growing national awareness of environmental matters will influence this trend as well.

Use in 1981 for wildernesses on the Forest is summarized in Table IV-17. Recreation Visitor Days (RVD's) and National Forest System (NFS) acres are for the total wildernesses. The Forest's portion is included in the totals.

TABLE IV-17.

WILDERNESS USE

Wilderness	Total RVD's	Net NFS Acres	RVD/AC/ Year	Relative Use Rating*
Raggeds	19,000	59,105	0.32	Low
Maroon Bells-Snowmass	211,300	179,042	1.18*	High
Collegiate Peaks	144,300	166,638	0.87	High
West Elk	57,000	176,092	0.32	Low
La Garita	32,300	103,986	0.31	Low
Big Blue	53,500	97,350	0.55	Moderate
Mt. Sneffels	11,100	16,200	0.69	Moderate
Lizard Head	28,200	41,158	0.69	Moderate
<u>TOTAL</u>	<u>556,700</u>	<u>840,456</u>	<u>0.66</u>	<u>Moderate</u>

*Relative Use Ratings Based on:

0-.35	Recreation Visitor Days/Acre/Year	Low
.36-.70	Recreation Visitor Days/Acre/Year	Moderate
.70+	Recreation Visitor Days/Acre/Year	High

Lands' Ability to Provide Opportunities for Unconfined Outdoor Recreation Experiences

The FPA has the capability to provide unconfined outdoor recreation opportunities. The capability is also not in short supply in the surrounding area.

Ability of Plant and Animal Species to Compete with People and Projects

No Federally or state-designated threatened or endangered plants or animals are known to exist in the FPA. The alpine ecosystems are fragile. Natural ecological forces will continue relatively undisturbed under all alternatives.

The Need to Provide Sanctuary for Species that Have Demonstrated an Inability to Survive in Less Primitive Surroundings

No biotic species have been identified that require a wilderness environment for survival.

Provide for Preservation of Unique Landform Types and Ecosystems

There are unique landforms in the FPA that are not currently represented in other surrounding wilderness areas. The Slungullion Earthflow has been designated in the National Registry of Natural Landmarks. Because of this designation protective management is provided and precludes the need for it being located in wilderness.

Cannibal Plateau and Calf Creek Plateau are recognized as some of the largest expanses of alpine willow ecosystems in the lower United States. Some scientific studies have been conducted in the FPA.

Need for the Designation of the Area as a Integral Part of the Recommended Powderhorn Wilderness

The FPA is adjacent to the BLM's recommended Powderhorn Wilderness and its high wilderness capability. The FPA is currently used by some recreationists as an undesignated extension of the recommended wilderness. This component of the need analysis attempts to determine the qualitative contribution of the FPA to the wilderness attributes of the recommended Powderhorn Wilderness. Is wilderness designation of the FPA necessary to protect or enhance the wilderness character or the primitive recreation experience of the recommended Powderhorn Wilderness? This analysis is based on some of the same attributes that are analyzed in WARS. These attributes are:

- Natural Integrity
- Apparent Naturalness
- Outstanding Opportunities for Solitude
- Opportunities for Primitive Recreation
- Supplemental Attributes (Ecological, Geological, Scenic, or Historic)
- Manageability

The fact that nonwilderness activities or uses can be seen or heard from areas within the wilderness shall not, of itself, preclude such activities or uses up to the boundary of the wilderness area.

Dispersed motorized recreation will increase in the future in Cannibal Plateau's vicinity if the FPA is not wilderness. This analysis projects the possible impacts of additional motorized use on the wilderness values of the recommended Powderhorn Wilderness.

Natural Integrity - This attribute relates to the degrees of development and its impacts within the area. Because of no real separation of the two areas, the natural integrity of the recommended Powderhorn Wilderness could be affected by significant motorized use in the FPA.

Apparent Naturalness - The FPA is only visible from the recommended Powderhorn Wilderness along the boundary between the two areas. Therefore, the apparent naturalness of the vast majority of the recommended Powderhorn Wilderness would be unaffected by motorized use in the FPA with the exception of the immediate area along the boundary between the two areas.

Outstanding Opportunities for Solitude - The size of the recommended Powderhorn Wilderness would increase by about 75 percent if the entire FPA were wilderness or 31 percent if the partial suitable alternative were wilderness. The distance from the perimeter to the core would increase on the north-south axis approximately seven miles. Motorized use in an unsuitable FPA could be heard along the adjacent boundary within the recommended Powderhorn Wilderness.

Opportunities for Primitive Recreation - The non-motorized recreation opportunities offered by the FPA are very similar to those included in the recommended Powderhorn Wilderness. The opportunities would enhance each other if the FPA is Wilderness. Motorized use in the FPA could conflict with wilderness use in Powderhorn along the shared boundary.

There is little data available on visitor use of the recommended Powderhorn Wilderness. Presently, there is no indication visitor dispersal is a problem. However, the main attraction portions of Powderhorn may have problems in the future as recreation use increases. The primary destination areas are Powderhorn Lake, Middle Fork of Powderhorn Creek, Hidden Lake, and during hunting season, the Wood Gulch, Fish Canyon Ridge, and Robbers Roost-Powderhorn Swamp. Devils Lake is only rarely visited. The majority of use occurs in a very small portion of Powderhorn. The rest of the area consists of relatively open hillsides or rolling, timbered areas.

The FPA does not have the potential to significantly increase visitor dispersal. It does not provide additional destination points. There is only one lake (Waterdog) and no area of high scenic attractiveness. It does provide several additional opportunities for one-way hikes on established routes. For example, Devils Lake to the Slumgullion Earthflow or to the Cebolla-Los Pinos Road provides highly panoramic views of the San Juan and La Garita Mountains and a primitive recreation experience. Future loss of wilderness capability, if unsuitable for wilderness classification in the FPA, would not decrease the primitive recreation opportunities in the south portion of the recommended Powderhorn Wilderness.

Primitive recreation carrying capacity increases in the suitable alternatives for the FPA. There is currently no primitive recreation ROS opportunities in the FPA. The suitable alternatives reclassify the recreation opportunities available from semi-primitive motorized to semi-primitive non-motorized, primitive, and pristine. These primitive and pristine opportunities could supplement the primitive recreation opportunities of the recommended Powderhorn Wilderness.

Supplemental Attributes (Ecological Geological, Scenic or Historic) - The supplementary attributes of the WARS rating for Cannibal Plateau RARE II Area indicates the ecological, scenic, and historic values of the area are not unique in the general area.

The Slumgullion Earthflow could provide geologic diversity to the recommended Powderhorn Wilderness.

Manageability - Some manageability problems are anticipated for the Powderhorn Wilderness if the entire FPA is not suitable for wilderness.

If motorized use is allowed to continue in the FPA, snowmobiles and motorcycles could enter the recommended Powderhorn Wilderness. While this presently is not a significant problem, it would be difficult to enforce restrictions on the shared boundary of the two areas. Vehicle restrictions could be more easily enforced if the restrictions were also applied to the FPA. Such restrictions could be applied without wilderness designation.

Presently, a manageability problem exists with the south boundary of the recommended Powderhorn Wilderness. The boundary is an artificial straight line between BLM and Forest land. It is not easily locatable on the ground and presents no physical barrier for preventing unauthorized use in the recommended wilderness. Designation of the FPA as wilderness would eliminate the problem in both the suitable alternatives.

Summary - The above discussion has shown no need to improve distribution or to decrease pressure on nearby wilderness areas or the recommended Powderhorn Wilderness. There is no shortage of opportunities for unconfined recreation experiences in the surrounding area. The FPA is not needed to protect threatened or endangered plant or animal species.

The FPA supplements the natural integrity, opportunities for solitude and the geologic character of the recommended Powderhorn Wilderness. There is no evidence it is essential to apparent naturalness, recreational opportunity diversity or visitor use dispersal of the recommended Powderhorn Wilderness. The supplemental opportunities provided by the FPA would remain available even without wilderness designation unless significant motorized use occurs. If such use occurs, they still can be maintained by additional management actions, such as restricting motorized use further.

Summary

Based on the analysis of the seven need criteria, the FPA is needed for wilderness to compliment the recommended Powderhorn Wilderness.

FISH AND WILDLIFE

Wildlife habitat will be improved through silvicultural activities, range revegetation, prescribed burning, and other vegetation treatment practices in all alternatives. The objective of these practices is to improve overall habitat diversity by eliminating large areas of single vegetation species type or successional stage. Vegetation treatment for wildlife is emphasized in certain areas needing better forage quality and quantity and vegetation diversity. Direction for indicator species are incorporated into the Forest Direction Management Requirements in the Plan for all alternatives. Table IV-18 displays non-structural wildlife habitat improvement by alternative over the planning horizon. Habitat improvement is cumulative for an average of 30 years. Most wildlife habitat improvement will be accomplished by vegetation treatment through coordination with other resource activities. These activities include commercial and noncommercial timber harvesting, reforestation, browse planting, thinning, prescribed burning, and range revegetation activities.

TABLE IV-18.

NON-STRUCTURAL WILDLIFE HABITAT IMPROVEMENT (Average Annual Acres Treated Over Planning Horizon)

Alternative	Type of Treatment		
	Silvicultural Treatment*	Aspen Treatment	Prescribed Burning
1	1,800	698	5,500
2	1,800	500	5,500
3	1,800	698	5,500
4	2,250	1,550	6,000
5	1,700	698	4,000
6	2,250	1,550	6,000
7	3,000	830	4,000
8	2,250	1,310	4,000
9	1,400	480	2,250

* Silvicultural treatment excludes aspen treatment.

The Forest's relatively small amount of seedling and sapling size stands are presently the factor limiting habitat diversity. Vegetation treatments such as timber harvesting produce seedling and sapling size stands with increased edge and diversity. This creates favorable conditions for wildlife. Aspen is a major habitat for many wildlife species. Aspen stand maintenance and regeneration is important for habitat diversity. Aspen treatment through clearcutting maintains the aspen habitat diversity needed for wildlife species. Harvesting increases the amount of available forage because more sunlight reaches the ground through created openings in the tree canopy.

Prescribed burning of oakbrush and pinyon-juniper types benefits range management and wildlife habitat. Burning prepares the site for regeneration, creates the edge needed for wildlife, and provides nitrogen nutrients needed for establishment of grasses and forbs. Burning also improves forage vigor and production and decreases the amount of unwanted vegetation. Areas can be reburned to prevent unwanted vegetation from reestablishing. As sprouts reinvade, browse producing vigorous twigs are available for wildlife use. Grasses and forbs increase following burning and have a short-term effect on forage available for wildlife and cattle. They provide excellent fuel for future burning. Burning produces a well-defined edge between forest and grassland. This edge provides hiding and thermal cover for wildlife. Within prescribed oak burn areas, unburned clumps are left to provide hiding and thermal cover. Habitat will increase for non-game ground nesting birds.

Indicator species habitat requirements are met by the management requirements in the Plan for all alternatives. Since habitat needs of the indicator species are met, the needs of all species represented by the indicator species are also met. Hiding and thermal cover and feeding areas are addressed. These requirements are essential for their continued existence.

Resource management contributes to wildlife habitat improvement through structural development, such as water impoundments and fences that protect riparian areas; through nonstructural practices such as prescribed burning that improve the range condition; and through proper grazing practices that improve the forage quality. Timber management contributes to wildlife by providing a broad spectrum of habitat conditions, for example, adequate amounts of each successional stage of each plant community and identified special and unique habitat - riparian zones, edges, snags, and dead and down woody material.

Table IV-19 summarizes the number of structural improvements by alternative, for both game and non-game species. Alternative 7 meets Colorado DOW goals outlined in the State Comprehensive Wildlife Plan for structural improvements. Many of the other State Comprehensive Wildlife Plan goals are achieved in all alternatives.

Structural improvements for wildlife include road closures, nest boxes where snags are difficult to maintain, large rock placement to increase pool riffle ratio in large streams, log structures to create pools in small streams, fences to defer or rest winter big game ranges from livestock use, water developments for both livestock and wildlife use, retention of downed logs for non-game use and retention of raptor nest trees. Benefits include better wildlife distribution, an increase in fish size and creel return, an increase in seclusion, and the retention of feeding, nesting and breeding habitat structures.

TABLE IV-19.

STRUCTURAL WILDLIFE HABITAT IMPROVEMENT
(Average Annual/Number)

Time Period	Alternative				
	1,4,6,8	2,3	5	7	9
1981-1985	10	35	30	40	0
1986-1990	10	35	30	40	0
1991-2000	10	35	30	47	0
2001-2010	10	35	30	45	0
2011-2020	10	35	30	45	0
2021-2030	10	35	30	45	0

It is important that wildlife be secluded from disturbance by man's activities which can result in excessive stress on the species. The location and management of roads is an important factor in creating stress on certain wildlife species. Increased road construction and motorized vehicle use can cause temporary big game displacement. By limiting the area under vegetation treatment open at one time in a large area, there will be seclusion remaining within the area. Travel management is displayed in the Plan, Chapter III, Forest Direction, Transportation System Management, mitigates this impact in all alternatives. Additional discussion is provided in the facilities section.

Road closures to vehicle use are management tools used to encourage the return of big game. Hiding and thermal cover are an integral part of silvicultural prescriptions designed to ensure continuance of wildlife habitat. Cavity nestors habitat are maintained by specifying wildlife trees in treatment areas.

The construction phase for utility corridors could disrupt wildlife in all alternatives in the short-term. Management Area Prescription 1D provides for utility corridors in all alternatives. Some adjacent habitat could be improved. Closure of corridors to vehicle use is necessary and planned for maintaining seclusion for wildlife.

In all alternatives, big game winter range forage management may result in decreased early and late use for livestock or more labor intensive expenditures by permittees as intensive management systems are implemented.

Closure to human use of big game winter ranges can curtail snowmobile, winter hunting, trapping for furbearers, cross country skiing, and firewood gathering during specific use periods in all alternatives.

The edges between vegetation communities is rich in wildlife, both in the number of species and the number of individuals. The greater the contrast between the two communities and the longer the edge, the better the wildlife habitat. Because of its potential to produce contrast in vegetation types, vegetation treatment by even-aged management produces more species richness than other methods.* Wildlife benefit considerably from management practices that increase edge. Alternatives 4 and 6 will benefit non-game wildlife the most because of the even-aged management accomplished in aspen stands. Alternatives 7 and 8 would provide the next greatest benefits, while Alternative 9 would provide the least.

In those alternatives, which recommend additional acres suitable for wilderness classification, the opportunities to manage wildlife habitat will decrease. However, because of the nature of the existing natural habitats, little habitat improvement work is scheduled in those areas. Wilderness classification will not significantly effect wildlife.

In all alternatives 19,104 acres of potential habitat for threatened and endangered species will be protected. These are potential nesting areas for the Peregrine Falcon and wintering areas for the Bald Eagle. Management requirements in the Plan ensure protection of threatened and endangered species. The Fish and Wildlife section in Chapter III displays threatened and endangered species that may occur on the Forest.

All alternatives will provide riparian and aquatic habitat protection or improvement by restoring riparian vegetation, improving stream channel characteristics, and upgrading cold-water fisheries. Management Area Prescription 9A, Plan, Chapter III, emphasizes riparian area management for all alternatives. Table IV-20 displays the number of cold water fish habitat improvement structures planned by alternative.

Increased recreation pressure could reduce creel return on major fishing rivers. Stream improvements can help meet this pressure by increasing the capability of streams to their potential. Wild trout waters should be emphasized as hatchery outputs are curtailed or greatly reduced. Emphasis for hatchery trout stocking is shifting from National Forest streams to large reservoirs which have a higher return of recreation visitor days.

Boulder placement increases the pool area in streams providing 1/3 increase in fish size. The most cost effective method of fishery improvement is to obtain conservation pools in existing reservoirs. A 25% surface acre pool in effect provides a fishery in 100 percent of the reservoir capacity until draw down occurs. Rainbow and native (cutthroat) trout, are the primary species stocked in reservoirs. Stream fishery also includes brown, and brook trout.

Source: *"Habitats in Managed Forest, The Blue Mountains of Oregon and Washington".

TABLE IV-20.

COLD WATER FISHERIES
STRUCTURAL IMPROVEMENTS
(Average Annual)

Alternative	Number of Improvements
1, 3, 4, 6, 7, 8	40
2	42
5	35
9	0

The range, timber, minerals, and facilities management programs impact riparian areas in all alternatives. Livestock use riparian areas for both grazing and resting. Riparian understory vegetation is opened up and habitat for small animals and birds is disturbed or destroyed. Mitigation of livestock grazing in riparian areas will be carried out by a variety of management practices. Deferred and rotation management systems will be used, coupled with such specific management practices as herding, salting and fencing. Timber harvesting can increase sedimentation if it occurs in riparian areas. This can increase water temperatures as a result of removing riparian cover. Changing to shelterwood harvest methods in riparian areas mitigates some of these adverse impacts. Road construction through riparian areas adversely affect vegetation, water quality, stream channels, and fisheries. Proper road location, and design will mitigate these effects. Stream crossings will be designed to avoid blocking of fish movement. Plan, Chapter III, Management Area Prescription 9A, emphasizes riparian area management for all alternatives.

Mineral exploration and development can disturb wildlife habitat. Operating plans will include provisions to minimize environmental impacts. Mitigation in the form of off-site habitat improvement could be required.

Habitat management is a joint effort between the Forest and the Colorado DOW. The Colorado State Comprehensive Wildlife Plan helps to set priorities for wildlife and fish projects. The DOW has the authority to control seasons, limits, fish stocking programs, and manageable herd sizes. The Forest provides the habitat necessary to manage the wildlife population.

Elk are near maximum numbers in relation to the limiting factor of winter range. Improvements to wildlife habitat will be to maintain existing populations in light of a declining winter range as private land use changes to fit the needs of an increasing human population, i.e. subdivision, mine expansion and mineral exploration. Wildlife habitat improvement will seek to hold big game longer on National Forest System land so that use of lower elevation ranges decreases.

The major factor limiting big game populations on the Forest is winter range availability. All alternatives will increase winter range, to varying degrees, through vegetation treatment. These increases will reduce the pressure on non-National Forest System land in some parts of the planning area. The Forest is cooperating with State and other Federal agencies to determine manageable herd sizes in relation to the winter range carrying capacity. Table IV-21 displays estimated National Forest System winter range carrying capacity by alternative. Current carrying capacity is 82,700 animals. Forage requirements for big game were also considered in the number of elk and deer in this table.

TABLE IV-21.

NATIONAL FOREST SYSTEM
WINTER RANGE CARRYING CAPACITY
(Average Annual, Thousand Animals)

Alternative	Time Period					
	1981- 1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
1	87.3	87.3	87.6	87.2	86.8	86.8
2	87.6	87.6	87.8	87.5	87.3	87.5
3	88.1	88.1	88.5	88.2	87.8	87.6
4	86.2	86.2	86.4	86.2	86.0	86.0
5	87.8	87.8	88.1	87.6	87.3	87.3
6	86.5	86.5	86.7	86.4	86.3	86.3
7	86.3	86.3	86.6	86.3	85.9	85.8
8	87.4	87.4	87.7	87.3	86.9	86.9
9	86.0	86.0	86.2	85.9	85.6	85.6

Fossil Ridge Wilderness Study Area

In Fossil Ridge the effect on the wildlife and fish resource is difficult to predict in any alternative. If the amount of human use increases dramatically or mineral exploration and development takes place, some impacts on wildlife use are inevitable. Deer and elk use the Fossil Ridge Wilderness Study Area as summer range and as a migration route. Curt Winters of the Tincup Civic Association, and others quoted the Area Supervisor for DOW as stating "Fossil Ridge land management is central to the management of elk in Unit 55". The Wilderness Study Area comprises only 7.5 percent of game management Unit 55. Lack of winter range is one of the main limiting factors in the elk population, but there is no winter range in the Wilderness Study Area. Therefore, the Wilderness Study Area is not critical habitat for big game. Fish populations and sizes would also be affected by increased pressure on prime fisheries.

Dick Wingerson of the High Country Citizen Alliance and others feel, "Non-wilderness designation for Fossil Ridge poses a major conflict with big game which the Forest Service chooses to ignore". All alternatives will not conflict with big game populations. The Wilderness Study Area is good summer range for big game, which is enhanced by the lack of vehicular travel and large numbers of people. Alternative D allows such vegetation treatment activities and these may lead to conflicts with big game. Each proposed project would be evaluated on a site-specific basis through the environmental analysis process.

Alternatives A, B and C will not have any significant impact on wildlife in the WSA. In these alternatives, there are no scheduled vegetation treatments over the 50-year planning horizon. In alternative D for the WSA, over the 50-year planning horizon the only vegetation treatment scheduled is timber harvest.

Vegetation treatments in alternative D could impact the wildlife resource. However, the WSA is not winter range for deer and elk, and is not habitat for threatened and endangered species.

Vegetation treatments in alternative D could impact elk calving and deer fawning areas. Impacts could include reduced habitat effectiveness, big game displacement and excess animal stress. Road closures to vehicle use are management tools used to encourage return of big game. Hiding and thermal cover are an integral part of silvicultural prescriptions designed to ensure continuance of wildlife habitat.

Vegetation treatments in alternative D produce seedling and sapling size stands with increased edge and diversity. This creates favorable conditions for wildlife.

The impacts on the wildlife resource from mineral exploration and development are displayed in the Minerals section of this chapter.

Wintering bald eagles drift through areas adjacent to the Wilderness Study Area and may occasionally fly over the WSA in the fall. But the Wilderness Study Area is not considered to be important winter habitat for the bald eagle. None of the alternatives would effect the bald eagle.

Alternatives B and C will not necessarily limit the number of people using an area. Limits or controls can be made on people numbers and activities regardless of the alternative to protect habitat effectiveness. The potential for conflicts between backpackers with dogs and big game may increase under all alternatives. The Colorado Division of Wildlife has regulations and enforcement jurisdiction to control harassment of wildlife by dogs.

Cannibal Plateau Further Planning Area

In Cannibal Plateau the effect on the wildlife and fish resource is also difficult to predict in any alternative. If the amount of human use increases dramatically, some impacts on wildlife use are inevitable. Deer and elk use the Further Planning Area as summer range and as a migration route. In light snow years, portions of the Further Planning Area serve as winter range for big game. Fish populations and sizes would also be affected by increased pressure on prime fisheries.

Alternatives A, B and C will not have any significant impact on wildlife in the FPA. In these alternatives, there are no scheduled vegetation treatments over the 50-year planning horizon. In alternative D for the FPA, over the 50-year planning horizon, the only vegetation treatment scheduled is timber harvest.

Vegetation treatments in alternative D could impact the wildlife resource. The FPA is winter range for deer and elk, but is not habitat for threatened and endangered species.

Impacts could include reduced habitat effectiveness, big game displacement and excess animal stress. Road closures to vehicle use are management tools used to encourage return of big game. Hiding and thermal cover are an integral part of silvicultural prescriptions designed to ensure continuance of wildlife habitat.

Vegetation treatments in alternative D produce seedling and sapling size stands with increased edge and diversity. This creates favorable conditions for wildlife.

The impacts on the wildlife resource from mineral exploration and development are displayed in the Minerals section of this chapter.

RANGE

Livestock grazing on the Forest will remain an important use in all alternatives. No alternative results in more than a 9% change from current levels. Table IV-22 displays the average annual grazing outputs by alternative.

TABLE IV-22.

PERMITTED LIVESTOCK GRAZING
(Average Annual, Thousand Animal Unit Months)

Alternative	Time Period					
	1981- 1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
1	324.0	331.8	335.8	335.8	335.8	335.8
2	323.3	330.0	333.3	333.3	333.3	333.3
3	325.0	335.0	339.9	339.9	340.1	340.1
4	317.5	312.4	309.9	309.9	309.9	309.9
5	327.5	342.3	349.8	349.8	349.8	349.8
6	317.5	312.4	309.9	309.9	309.9	309.9
7	327.5	341.8	349.9	349.9	349.9	349.9
8	324.2	332.5	336.7	336.7	336.7	336.7
9	315.0	315.0	315.0	315.0	315.0	315.0

Alternatives 3, 5, and 7 are designed to favor market output opportunities and will increase permitted livestock grazing 6% to 9% by period 6. Alternatives 4 and 6, which place least emphasis on market outputs, reduce grazing by 3%. Alternative 9 is the reduced budget alternative. Its goal is to maintain a mix of all outputs similar to the current mix, but schedules a 2% reduction in grazing. Alternatives 1, 2, 3, 5, 7, and 8 increase range conditions and grazing capacity by increasing investments in structural and non-structural range improvements. Silvicultural activities, oakbrush management, and sagebrush control benefit the range resource.

All alternatives schedule livestock to use transitory range. This range may be created within or outside existing allotments. The range will not increase overall grazing capacity. It will provide additional opportunities for the grazing permittee and the Forest Service. This range may be used to rest pastures more often, or supplement range improvement work in other areas.

The local livestock industry will be subjected to adverse impacts under Alternatives 4, 6, and 9 in both the short and long-term due to the reductions in grazing levels. Some individual permittees will be affected to a varying degree in all alternatives. Some allotments will continue to be managed in a manner similar to present operating plans regardless of alternative.

Intensive grazing practices, such as rest or deferred rotation are more effective in improving range condition than season-long extensive grazing practices. Specific requirements for intensive management is located in the Forest Direction Management Requirements in the Plan for all alternatives.

Prescribed burning in oakbrush and sagebrush removes the shrub overstory stimulating grass production. These improvements are relatively short-termed on any particular area. Areas would be reburned to prevent shrubs from re establishing. Additional discussion of prescribed burning is displayed in the "Fish and Wildlife" section of this chapter.

Soils in riparian areas open to grazing will be susceptible to erosion and compaction in all alternatives. Trampling denudes the soil and makes it susceptible to erosion. Fencing and herding is used to reduce trampling and trailing in sensitive areas. Wet soils can be easily compacted by concentrated use. Site-specific impacts on riparian areas will occur under all alternatives. The individual allotment management plans identify these impacts and implement mitigating measures in all alternatives.

Heavy livestock use in riparian areas can decrease water quality and result in increased water temperature. Foliage is trampled and browsed. Riparian areas would be subject to increased grazing pressure under the higher livestock grazing of Alternatives 3, 5, and 7. Riparian discussion is displayed under the "Fish and Wildlife" section of this chapter.

Big game winter range is also important spring and fall livestock range. Higher grazing outputs in Alternatives 3, 5, and 7 would require higher utilization of winter range. The forage available for big game use is low. The reduction in winter range forage affects the number of big game the Forest can support. Big game avoid livestock concentration areas. Alternatives 3, 5, and 7 increase livestock concentrations to levels that may cause conflict with big game use. The remaining alternatives, including the Proposed Action, limit the possible

conflict through intensive range management and structural and non-structural improvements. Forest Direction management requirements in the Plan provide for resource conflict resolution in favor of big game winter range management in all alternatives.

All alternatives will enhance the range resource through timber management. All alternatives schedule livestock to use transitory range created by openings in tree stands and resulting increased forage production. Livestock can affect reforestation success on transitory range. Livestock use in these areas could result in delayed regeneration and poor stocking levels resulting from trampling. Where transitory rangeland is created through timber harvest, primary emphasis will be given to stand regeneration. Construction of structural improvements to exclude livestock from stands being regenerated could be required in all alternatives. See management requirements in the Plan for mitigating actions to be implemented.

Fences, gates, and cattleguards are necessary to minimize conflicts with developed recreation use. Structural range improvements will be located to meet visual quality objectives in all alternatives.

Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area

In both Cannibal Plateau and Fossil Ridge livestock use or management activities would not change significantly under any alternative. Some minor inconvenience to the grazing permittee or the Forest Service might occur due to limitations on vehicle use under Alternatives B and C. Non-structural range improvements are not planned for the WSA. Livestock tend to concentrate near water storage and riparian areas. Recreationists in any alternative will continue to view cattle and cattle trails.

Eleven water developments and one mile of fence are planned for the FPA in alternatives A and D. Alternatives B and C would increase costs of these developments but would not preclude them.

TIMBER

All National Forest System land was analyzed for capability, availability, and suitability for timber production. Land failing to meet criteria established for these three categories is not considered for timber production. All land which meets the criteria was classified tentatively suitable land and considered for timber production. Approximately 37% (1,089,208 acres) of the Forest is classified tentatively suitable for timber production.

From the tentatively suitable land, land to be managed for timber production was classified suitable land. Land not classified for timber production was classified unsuitable land. Suitable land is determined by alternative direction. Table IV-23 displays suitable land by alternative. Land within areas suitable for wilderness in a particular alternative is placed in the reserved category and is unavailable for timber production.

TABLE IV-23.

ALTERNATIVE DISTRIBUTION OF SUITABLE TIMBERLAND
(Acres)

	Alternative								
	1	2	3	4	5	6	7	8	9
Capable, Available and Tentatively Suitable Forest Land Adjustments from alternative, specific allocations by cause:	1,089,208	1,089,208	1,089,208	1,089,208	1,089,208	1,089,208	1,089,208	1,089,208	1,089,208
A. Timber production incompatible with allocation.									
1. Wilderness proposal identified in alternative formulation.	-1,173	0	+32,181	-17,410	+32,181	-1,173	-17,410	-1,173	+32,181
B. Economically not suitable.									
1. Markets not available (aspen).	462,183	468,975	453,494	471,512	461,381	472,572	464,421	469,802	468,976
2. High logging cost.	144,280	142,236	96,323	222,750	108,616	201,777	155,828	126,639	174,848
C. Capable, available and suitable but surplus to timber production objectives in the particular alternative.	7,667	32,449	0	101,044	8,000	112,874	51,158	43,664	131,976
Land Suitable for Timber Production by Alternative	476,251	445,548	507,210	311,312	479,030	303,158	435,211	450,276	331,227

The number and distribution of stand age groups do not change the long-term sustained-yield capacity, but affects how the Forest gets to this level. The suitable timberland on the Forest should have approximately an equal acreage of each age group. To obtain this age grouping and distribution it is important to regenerate older stands.

The primary means for achieving desired stand stocking and proper stand age distribution is vegetation treatment through harvests, stand improvement, and reforestation. All alternatives provide for these treatments but at different levels. By-products of these treatments may be sold or made available to the public on a permit basis. These by-products can include posts, poles, firewood or sawlogs.

Allowable sale quantity varies with each alternative. The differences in yields are determined by the area suitable for timber production and treatment method. Yield is also affected by the silvicultural activity used but to a lesser extent than the effect of suitable acres. Long-term sustained-yield capacity is the maximum sustained-yield which can be expected once the land suitable for timber production is in a fully managed state. This is determined by the amount of land suitable for timber production and the management prescription applied in a particular alternative.

Alternatives 4, 6, and 9 with the least suitable timberland, have the lowest long-term sustained-yield capacity; and Alternatives 3 and 5 with the most suitable timberland, have the greatest yield capacity. Table IV-24 displays programmed timber sales offered and long-term sustained-yield capacity by alternative.

TABLE IV-24.

PROGRAMMED SALES OFFERED
(Average Annual Output, Million Board Feet)

Alternative	Long-Term Sustained Yield Capacity	Time Period					
		1981- 1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
1	104.9	33.0	37.0	35.0	35.0	38.3	41.1
2	104.1	28.0	28.0	28.0	29.7	33.9	39.9
3	115.6	40.8	40.8	44.2	45.0	45.0	48.8
4	55.9	13.5	13.5	13.5	14.6	15.2	21.0
5	117.0	35.0	35.0	35.0	35.0	37.4	40.1
6	57.1	13.5	13.5	13.5	14.3	15.1	17.6
7	96.9	30.0	30.0	30.0	31.6	31.6	35.0
8	109.5	35.0	35.0	35.0	35.0	35.0	37.5
9	62.6	22.0	22.0	22.0	22.0	22.0	23.7

Alternatives 1, 2 (Current management), 3, 5, 7, and 8 maintain or increase existing allowable sale quantity. Alternatives 4, 6, and 9 decrease allowable sale quantity below existing current management.

Table IV-25 displays the base sale schedule by alternative for 240 years. The volumes displayed for each decade represent the allowable sale quantity for that alternative.

TABLE IV-25.

BASE SALE SCHEDULE
(Million Board Feet Per Decade)

Decade	Alternative								
	1	2	3	4	5	6	7	8	9
1	350	280	408	134	350	134	300	250	220
2	350	280	442	135	350	135	300	350	220
3	350	297	450	146	350	144	316	350	220
4	383	339	450	152	375	151	316	350	237
5	411	399	488	210	401	176	350	375	265
6	411	400	674	212	401	197	397	407	265
7	411	400	674	212	401	197	397	407	265
8	411	400	674	212	401	197	397	407	378
9	787	743	743	452	797	434	714	675	378
10	787	743	743	452	797	434	714	675	378
11	787	743	743	452	797	434	714	675	378
12	787	743	743	452	797	434	714	675	378
13	787	743	743	452	797	434	714	675	378
14	787	743	743	452	797	434	714	675	378
15	787	743	743	452	797	434	714	675	378
16	857	743	1,000	452	797	434	714	675	587
17	857	743	1,000	452	848	434	714	892	587
18	857	743	1,000	452	848	434	714	892	587
19	857	743	1,000	452	848	434	714	892	587
20	857	743	1,000	452	848	434	714	892	587
21	857	743	1,000	452	848	434	714	892	587
22	857	743	1,156	452	848	434	714	892	587
23	857	743	1,156	452	848	434	714	892	587
24	857	743	1,156	452	1,169	472	807	1,095	626

By the end of the planning horizon each alternative will have improved stocking levels and stand age distribution on land suitable for timber production. Some sales will be located on suitable timberland which has timber management as its objective. Other timber sales will also be located on suitable timberland which has wildlife habitat improvement and range improvement as their objective.

Table IV-26 shows the average annual number of acres treated by silvicultural system for each time period. The acres treated are those where commercial harvest is expected.

TABLE IV-26.

HARVEST METHOD
(Average Annual Acres Treated)

Alt.	Time Period	Inter- mediate Cut*	Clearcut*	Prep. Cut*	Shelterwood Regeneration Cut	Overstory Removal	Total
1	1	0	748	5,118	640	640	7,146
	2	0	748	5,118	640	640	7,146
	3	0	747	4,225	528	528	6,028
	4	0	396	469	5,118	640	6,623
	5	138	325	1,413	4,225	528	6,629
	6	39	218	501	469	5,118	6,345
2	1	0	321	3,510	439	439	4,709
	2	0	321	3,510	439	439	4,709
	3	0	270	3,013	377	377	4,037
	4	0	237	317	3,510	439	4,503
	5	177	161	2,408	3,013	377	6,136
	6	62	167	1,749	317	3,510	5,805
3	1	0	1,506	4,829	603	603	7,541
	2	0	1,506	4,829	603	603	7,541
	3	62	1,388	4,825	603	603	7,541
	4	47	650	2,190	4,829	603	8,319
	5	0	394	2,042	4,825	603	7,864
	6	69	357	2,689	2,190	4,829	10,134
4	1	0	320	2,265	283	283	3,151
	2	0	320	2,265	283	283	3,151
	3	0	209	1,956	244	244	2,653
	4	0	182	273	2,265	283	3,003
	5	115	131	434	1,956	244	2,880
	6	62	133	782	273	2,265	3,515
5	1	0	725	5,125	641	641	7,132
	2	0	725	5,125	641	641	7,132
	3	0	748	4,228	528	528	6,028
	4	0	402	470	5,125	641	6,638
	5	126	353	1,255	4,228	528	6,490
	6	97	260	280	40	5,125	5,802

TABLE IV-26. (Cont.)

Alt.	Time Period	Inter- mediate Cut*	Clearcut*	Prep. Cut*	Shelterwood Regeneration Cut	Overstory Removal	Total
6	1	0	320	1,251	281	281	3,133
	2	0	320	2,251	281	281	3,133
	3	0	207	1,955	244	244	2,650
	4	0	167	204	2,251	281	2,903
	5	961	115	403	1,955	244	3,678
	6	810	94	200	204	2,251	3,559
7	1	0	700	4,651	581	581	6,513
	2	0	700	4,651	581	581	6,513
	3	0	523	4,040	505	505	5,573
	4	0	344	646	4,651	581	6,222
	5	177	389	467	4,040	505	5,578
	6	0	186	97	646	4,651	5,580
8	1	0	695	5,227	654	654	7,230
	2	0	695	5,227	654	654	7,230
	3	0	574	4,531	566	566	6,237
	4	0	299	535	5,227	654	6,715
	5	177	191	817	4,531	566	6,282
	6	0	125	0	535	5,227	5,887
9	1	0	424	3,322	415	415	4,576
	2	0	424	3,322	415	415	4,576
	3	0	389	2,815	352	352	3,908
	4	0	237	275	3,322	415	4,249
	5	177	161	364	2,815	352	3,869
	6	0	167	0	275	3,322	3,764

* Intermediate Cuts = All entires into the stand prior to the regeneration cuts.

Clearcut = A regeneration cut.

Shelterwood = A regeneration system, include preparatory, seed, and removal cuts.

Alternatives 1, 3, 5, 7, and 8; which have the higher base sale schedule, have a greater potential for bringing more area under management sooner and thus achieving a balanced age class distribution quicker. A balanced age distribution for each timber type is desirable because it reduces risk of losses to insect and disease mortality, has greater vigor than a Forest with large areas in old growth condition, and provides more wildlife habitat diversity.

The Natural Resources Defense Council, National Audubon Society and several other organizations and individuals expressed concern that the timber harvest levels analyzed in the Draft EIS were too high and therefore uneconomical. The National Audubon Society, for example, recommended, "The Forest should start by cutting only the 8.2 million BF/year that can realize a return on the public's money, and carefully analyze the need for more." The economic analysis discussed in Appendix E, Draft and Final EIS, indicated that the most cost-efficient timber harvest level, when only timber is valued, would be 8.7 MMBF/year. The analysis also considered the most cost-efficient timber harvest level when the benefits to livestock grazing, deer and elk, and dispersed recreation were considered.

The resulting harvest levels were not intended to be conclusive because the analysis only included benefits valued in the FORPLAN model. Other benefits including insect and disease prevention, recreation quality, cultural resource discovery, visual enhancement, water production, firewood, and the maintenance of plant and animal diversity (other than that for deer and elk) were not included in the analysis.

Timber harvest also supplies products to local dependent industry, thereby benefiting the economy through employment and income, and providing revenue directly to governments through taxes on dependant and supporting industries. The associated values of timber harvest cannot be disregarded in the economic considerations.

The alternative timber harvest schedules analyzed in the Draft and Final EIS are realistic cost-effective management options aimed at benefitting associated resources as well as providing various levels of wood fiber for dependent industry.

The response to Comment 42, Planning Question 8 in Chapter VI, expands on this discussion. Also, refer to the discussion under "Timber" in Chapter III.

As noted in Chapter II, under "Alternatives Considered and Eliminated From Detailed Study", some groups feel the timber outputs for the Proposed Action should be increased. Correspondence commenting on the Proposed Plan, indicated a group of investors, to be known as Continental Lumber Company, wish to construct a modern sawmill and planer mill in Montrose, Colorado. Continental indicated that the timber demand figures displayed in the Draft EIS are based on past harvest volumes and have no allowance for future industrial development. Continental stated, "We request that your annual sales program be rescheduled to reflect more total management of the timber resource. An annual sale of 55-60 MMBF saw logs would alleviate the constrictions of timber resource supply and allow justification of the large capital expenditures required to establish a modern process facility." The request to revise the timber harvest was endorsed

by the Montrose Chamber of Commerce, Intrawest Banks, Club 20, Mayor of Montrose, City Council of Montrose and the Montrose Board of Commissioners. The reviewer is encouraged to review Chapter II, Chapter VI for above commentors and Appendix M for additional information on accelerated harvest schedule.

Table IV-27 displays firewood availability by alternative for the first decade. Estimated demand is nine million board feet/year. Sources of firewood consists primarily of: (1) unsalvaged natural mortality, (2) trees too small for sawlogs that are surplus to growing stock needs, and (3) unmerchantable portion of trees harvested for sawlogs. Although this is specific material identified as firewood, trees offered for sale may be utilized by the purchaser for any product desired, including firewood. The volumes displayed below are not included in the Allowable Sale Quantity, and therefore are not accountable toward the Allowable Sale Quantity.

TABLE IV-27.

ESTIMATED FIREWOOD SUPPLY
(Average Annual, Million Board Feet)

Alternative	Million Board Feet
1	11.2
2	9.0
3	14.1
4	4.3
5	11.2
6	4.3
7	9.6
8	11.2
9	7.0

Alternatives 1, 2, 3, 5, 7, and 8 will meet firewood demand through 1990. Alternatives 4, 6, and 9 will not meet the firewood demand for the first decade. Accessibility is an important factor when considering firewood availability. The road mileage constructed or reconstructed is basically dependent on the amount of timber harvested. Roads and associated use provide opportunities for firewood gathering. See Chapter III, Facilities, for discussion of travel management. The Plan, Chapter III, Forest Direction, Transportation System Management, provides direction on roads open, closed, or restricted for all alternatives.

In general, effects are caused by timber management activities which reverse or slow successional trends. Regeneration cutting, for example, removes mature and overmature timber stands and creates suitable environmental conditions for a new, young stand to become established. Timber stand improvements provide optimum growing conditions which delays the onset of decadence associated with aging timber stands. Some timber management activities may speed successional trends - artificial reforestation, for example.

The High Country Citizens' Alliance and Colorado Open Space Council felt the Forest Service should use individual selective cutting and group selection to maintain more natural uneven-aged stands with small clearings.

The Forest Service recognizes individual and group selection harvest. They are valid silvicultural tools that are used, where appropriate, to help achieve specific management goals. The Silvicultural Prescriptions Management Activity, Plan, Chapter III, Forest Direction, lists group selection as an appropriate harvest method for mixed conifer, lodgepole pine, spruce/fir and ponderosa pine timber types; and single tree selection appropriate for spruce/fir and ponderosa pine timber types.

No less important is the effect of land management allocations which do not allow or significantly restrict tree removal. Wilderness and non-motorized recreation management prescriptions allow the ever-present processes of natural succession to be the cause of changes in the Forest environment. The resulting climax tree stands are slow growing, mature trees with high levels of mortality due to a variety of insect and disease agents. These areas also serve as centers of insect and disease activity which may spread to adjacent lands.

All alternatives schedule past reforestation needs by 1984. Reforestation is necessary as a result of harvest, wildfires and other catastrophic events. To better insure regeneration of harvested conifer stands, some work will be done at the time of the regeneration cut. The necessary work will be seed bed preparation to encourage natural regeneration. If natural regeneration is not expected to occur or does not occur, the area will be planted. No work is planned in aspen following harvest as natural regeneration readily occurs in this timber type.

The amount of reforestation activity varies with each alternative, and is determined by the amount of suitable timberland acres and the silvicultural treatment of these acres. Table IV-28 displays the reforestation acres by alternative.

TABLE IV-28.

REFORESTATION
(Average Annual Acres Treated)

Alternative	Time Period					
	1981- 1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
1	408	408	343	380	381	364
2	270	270	232	259	353	333
3	422	422	422	466	440	567
4	227	227	191	216	207	252
5	402	402	340	375	366	327
6	225	225	191	209	264	255
7	368	368	315	315	315	315
8	408	408	352	379	355	332
9	262	262	224	243	223	217

Timber stand improvement (TSI) activities help increase growth rate, improve timber quality, maintain desirable species composition, prevent insect and disease outbreaks, and maintain vigorous timber stands. Table IV-29 displays the TSI schedule by alternative.

TABLE IV-29.

TIMBER STAND IMPROVEMENT
(Average Annual Acres Treated)

Alternative	Time Period					
	1981- 1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
1	1,200	300	200	500	500	700
2	625	625	625	625	625	625
3	1,200	300	200	500	500	700
4	585	585	585	585	585	585
5	1,000	1,000	1,000	1,000	1,000	1,000
6	585	585	585	585	585	585
7	900	900	900	900	900	900
8	1,000	1,000	1,000	1,000	1,000	1,000
9	1,528	1,528	1,528	1,528	1,528	1,528

Recreation opportunities are affected by timber management. Road construction necessary to provide access to manage the timber resource causes impacts. These impacts are discussed in the "Facilities" section of this chapter. Road construction and subsequent road use will displace some Forest users seeking an unroaded recreation experience where roads are left open to motorized use. Closed roads improve access for Forest user's seeking non-motorized recreation opportunities. Those alternatives with the greatest road mileage will have the greatest impact. The impacts to dispersed recreation opportunities are mitigated by maintaining visual quality and through road and travel management. See the discussion of travel management in Chapter III, "Facilities" section. Although the timber management impacts are short-termed, the immediate change to the existing landscape is undesirable to many Forest visitors. Visual quality objectives provide the method for conducting activities while protecting the visual resource. Treatments will be spaced and timed to minimize adverse visual impacts. Trails will be protected from incompatible activities in all alternatives. Additional discussion of timber impacts on the recreation resource are displayed in the Recreation and Facilities sections of this chapter.

Timber management activities impact wildlife in all alternatives. Mitigation measures include cutting unit modification to protect wildlife. Other effects are described in the preceding "Fish and Wildlife" section. The management area prescriptions, Plan, Chapter III, display mitigation for timber management activities.

The Forest will have abundant old growth under all alternatives. Old growth will be distributed throughout the Forest on areas where timber treatments is limited or not practiced, such as on slopes greater than 40 percent, some riparian areas or within wilderness. Riparian is one of the most abundant

habitat types and preferred by a great number of wildlife species. Timber harvesting that does occur in riparian areas may have an adverse effect. Potential effects include increased sedimentation and water temperature as a result of removing riparian cover. Adverse effects are mitigated in all alternatives by modifying silvicultural methods to meet wildlife, visual and riparian ecosystem goals. See additional riparian area discussion in the "Fish and Wildlife" and "Range" sections of this chapter.

Transitory range can be created by timber management. This effect is described in the preceding "Range" section.

Timber activities impact the soil in all alternatives. Alternatives 1, 3, 5, and 8, with the greatest timber harvest scheduled would have the greatest potential for adverse impacts. Harvesting and site-specific activities including yarding, dozer piling, burning, and scarification impact the soil. Impacts include increased soil erosion potential, and loss of soil productivity. The effects of road construction on soil and other resources are discussed in the facilities section of this chapter. Mitigation is summarized in the last section of this chapter. Mitigation measures are also displayed in the Plan, Chapter III for all alternatives.

Land not suitable for timber production are typically in areas of steep slopes where road construction and management costs are high. Administrative and developed recreation sites (excluding winter sports sites) are also considered not suitable. The unsuitable lands were not used to calculate the allowable sale quantity or long-term sustained yield capacity. While timber production is not permitted or planned, tree removal may occur to meet other resource objectives. Any volume removed from land classified as not suitable for timber production is not chargeable to the allowable sale quantity. Tree removal is appropriate under the following conditions:

- Salvage or sanitation of stands which are damaged by fire, windthrow, or other catastrophe, or which are in imminent danger from insect or disease attack.
- Tree cutting for research to gain knowledge about tree growth, insect or disease organism, or the effect of such harvesting on other resources.
- Tree removal to promote safety of Forest users such as hazard tree removal in camp and picnic grounds, administrative sites, and along roads open to the public.
- Tree cutting to meet specific habitat needs of threatened or endangered animal or plant species, or to improve and/or protect the habitat of other wildlife.
- Tree cutting to improve the scenic resource by opening scenic vistas or improving visual variety.
- Removal of dead material for firewood, fence posts, poles, and props.
- Cutting of Christmas trees and removal of transplants.

--Harvesting trees to improve water yields when permanent openings are created. (No investment in reforestation practices will be made.)

--Creation of openings for powerlines, roads and other facilities.

Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area

In Fossil Ridge WSA in Alternative A, the forested areas are legislatively withdrawn under the Colorado Wilderness Act of 1980 from management activities designed to produce timber on a sustained yield basis. Natural succession processes would be the dominant course of change in the forest. This would result in climax tree stands composed of slow growing mature trees that suffer from high levels of mortality due to a variety of insect and disease agents.

The forested areas in the unsuitable portion of Alternative B for Fossil Ridge WSA would be managed to maintain existing wilderness characteristics until Congress acts on the administration's proposal. No timber harvests are scheduled. Forested areas would be subject to natural succession processes and age class structure and expected consequences would be as discussed for Alternative A of the WSA.

The forested areas in the unsuitable portion of alternative B for Cannibal Plateau would be managed the same as in alternative A for FPA.

In Alternative A for Cannibal Plateau FPA, forested areas would be classified capable, available and tentatively suitable. They are further classified surplus to timber production needs in the determination of the Forest's allowable sale quantity. The processes of natural succession would be the dominant cause of change in the forest. This would result in climax tree stands composed of slow growing mature trees that suffer from high levels of mortality due to a variety of insect and disease agents. Vegetation treatment to control insects and disease and to benefit other resources such as wildlife, visuals and water could take place, but volumes harvested would not be included in the Forest's allowable sale quantity.

In Alternative C and the suitable portion of Alternative B, forested areas would be unavailable for vegetation treatments for the WSA and FPA. The processes of natural succession would be the dominant cause of change in the forest. Age class structure and expected consequences would be as discussed for Alternative A. Vegetation treatment for control of insects and disease would have to be analysed and done only when justified by predicted losses to resource values outside of the wilderness.

In Alternative D for both Fossil Ridge and Cannibal Plateau, the forested areas would be classified capable, available and suitable for timber production and would be managed on a sustained-yield basis. Timber harvests would be designed to achieve multiple-use objectives. Vegetation treatment would produce improved stand stocking and a balanced stand age distribution. The mature spruce-fir in the FPA and WSA makes the trees susceptible to insect and disease infestations. In Alternative D, timber management would change the FPA's and WSA's age class distribution from mature to early successional stages reducing the susceptibility to insect and disease attacks. These early successional stages would provide important habitats for wildlife. Timber management could increase water

yield and degrade water quality. Timber management could have a variety of effects on the recreation, range, visual, and cultural resources. The wilderness characteristics of the FPA and WSA would not be maintained. Firewood access and supply availability would be improved. Much of the firewood along existing roads has been removed. Access for timber management in Alternative D could also improve access to the FPA and WSA for recreation and mineral exploration and development.

Vegetation treatment activities and associated impacts on other resources are discussed under the various resources of this chapter for the WSA and FPA.

Vegetation treatment activities would be analysed through the environmental analysis process for the WSA and FPA. Impacts would be mitigated by Forest Direction Management Requirements and Management Area Prescriptions in the Forest Plan.

In alternatives A, B and C for both Fossil Ridge WSA and Cannibal Plateau FPA, there are no scheduled vegetation treatments over the 50-year planning horizon. In alternative D for the WSA and FPA, over the 50-year planning horizon, the only vegetation treatment scheduled is timber harvest. However, no vegetation treatment in alternative D is scheduled over the next ten years.

WATER

The timing and yield of runoff from the Forest can be manipulated by modifying vegetation and snowpack conditions. Two primary management practices are available to accomplish these modifications: structural snowpack controls (snowfences) and vegetation treatment. Both of these management practices increase runoff by reducing the amount of moisture lost to evaporation and transpiration in all alternatives. By reducing evapotranspiration losses, more water is available for runoff and increased streamflows can occur.

Vegetation can be treated in several ways to reduce evapotranspiration and increase water yield. The most effective method relies on clearcutting small five to ten acre areas. These small clearcuts reduce vegetation evapotranspiration and at the same time allow blowing snow to be deposited in the small clearcuts. This reduces snow evaporation losses.

Vegetation treatment effects on water yield varies with the amount of precipitation a site receives, the type of tree management that is employed, and the tree regrowth rate. Treatment in a high elevation, high precipitation area will yield more additional water than treatment at a lower and drier site. Spruce/fir provides the greatest opportunities to manage for increased water yields. The long-term water yield increase will be less when treating a rapidly regrowing tree species such as aspen. Small clearcuts will result in a greater water yield increase than if the same tree volume is removed by large clearcuts or other timber management practices. Larger clearcuts or shelterwood cuts will result in water yield increase; however, the increase will be less than if the openings are created in five to ten acre sizes.

Most prescriptions provide vegetation treatment activities that can be designed to increase water yield while at the same time provide for multiple-use benefits. Only management prescriptions 1A, 8A through 8D, 10A, and 10C, do not

provide for vegetation treatment that could be employed to increase water yield. Conversely, management prescription 9B emphasizes water production in five to ten acre clearcuts in all alternatives.

Table IV-30 summarizes significant effects on the water resource. The table displays vegetation treatment effects on water production and sediment yield from National Forest System land. In those alternatives where additional acres are suitable for wilderness, a slight decrease in water yield potential and sediment production will occur. This is due to the reduction of vegetation treatment opportunities in those areas.

The Natural Resources Defense Council (NRDC) and some individuals who responded to the Draft EIS, object to clearcutting as a method for increasing water yield. They feel that erosion and turbidity would increase substantially. Although there is a potential for increased erosion, Forest Management Direction and Standards and Guidelines in the prescriptions include safeguards to minimize on-site disturbance and erosion during and after the activity. Monitoring of water quality is scheduled to ensure that the cumulative effects of all activities do not exceed water quality standards. The NRDC feels that timber harvest to increase water yields is a short-sited rationalization for increased timber harvest levels.

In all alternatives, with the exception of applying intensive vegetative and structural measures designed to increase water yields on a small acreage (Prescription 9B, 14,150 acres), most of the planned activities are primarily designed to reach other objectives such as wood fiber production, improved wildlife habitat, improved access, etc. In projecting the effects of proposed management on water yields, we have recognized that additional water yield will result from these activities as an additional benefit. Basically, vegetation treatment conserves water that would normally be lost through the processes of evaporation and transpiration, and makes it available for use on-site and downstream. Adequate safeguards are included in the management direction to prevent hydrologic destruction of the forest's natural functions.

TABLE IV-30.

EFFECTS ON WATER YIELD AND SEDIMENT

	Alternative								
	1	2	3	4	5	6	7	8	9
PERIOD 2 (Thru 1990)									
Increase in Water Yield									
Over Baseline (Ac Ft/Yr)	29,501	26,313	30,400	25,582	29,397	25,444	28,496	32,863	25,156
Over Current (Ac Ft/Yr)	10,898	7,710	11,797	6,981	10,794	6,841	9,893	14,260	6,553
Percent Increase Over Current	0.4	0.3	0.4	0.2	0.4	0.2	0.3	0.5	0.2
Increase in Sediment									
Over Current (Ac Ft/Year)	1.06	.75	1.12	.68	1.06	.67	.96	1.38	.64
PERIOD 6 (Thru 2030)									
Increase in Water Yield									
Over Baseline (Ac Ft/Yr)	38,013	33,435	37,841	32,601	37,450	32,321	35,335	43,531	31,210
Over Current (Ac Ft/Yr)	19,410	14,832	19,238	13,998	18,847	13,718	16,732	24,928	12,607
Percent Increase Over Current	0.7	0.5	0.7	0.5	0.7	0.5	0.6	0.9	0.4
Increase in Sediment									
Over Current (Ac Ft/Yr)	1.75	1.34	1.71	1.23	1.70	1.20	1.48	2.20	1.14
Percent of Water Yield									
Increase Potential Achieved* (50-Year Period)	29.0	22.1	28.7	20.9	28.1	20.5	25.0	37.2	18.8
Cumulative Increased Water Production (50-Year Period)									
Acres Feet	823,835	585,600	887,300	608,500	800,300	596,300	713,400	1,062,800	497,260
Cumulative Increase in Sediment (50-Year Period)									
Acres Feet	75	54	80	56	73	54	66	98	46

* The water yield increase potential from tentatively suitable forest land on slopes less than 40% is calculated to be 67,000 acre-feet per year over current levels. A potential 2.3 percent increase.

The water yield increase range, compared to current levels, in 1990 is 0.2 to 0.5%. Short-term (10 year) increases in water yield range from low 6,550 acre feet/year to high 14,300 acre feet/year. In year 2030, the range is 0.4 to 0.9%. The projected average annual water yield increase for each alternative about doubles after 50 years compared to the first 10 years, due to cumulative long-term effects of vegetation treatment.

Expected water yield increases are projected from timber harvest and road construction activities. Wildlife and range improvement projects, including clearcutting aspen and burning oakbrush will also contribute to water yield. Tables IV-31 and IV-32 display the results by watershed for the end of the first decade (1990) and the end of the fifth decade (2030).

TABLE IV-31.

WATER YIELD SUMMARY BY NATIONAL FOREST SYSTEM WATERSHED
(Average Annual Water Yield Increase Over Current by 1990)

Watershed Number	Watershed Name	Water Yield		Range of Increase* (Percent)
		Baseline (Ac Ft Yr)	Current (Ac Ft Yr)	
01	Ohio Creek	102,219	102,393	0.3 - 0.5
03	Soap - Beaver Creeks	147,753	148,925	0.1 - 0.3
05	Smith Frk - Curecanti Creek	100,643	101,853	0.2 - 0.3
07	Anthracite - Coal Creeks	132,449	132,819	0 - 0.1
09	Muddy Creek	112,318	112,452	0.1 - 0.4
11	North Fork Gunnison River	99,289	99,616	0.1 - 0.4
13	Tongue - Currant Creeks	72,282	72,497	0.3 - 1.2
15	Kannah Creek	47,382	47,902	0 - 0.3
17	Plateau Creek	107,938	108,280	0.3 - 1.1
19	Buzzard Creek	53,307	53,631	0.1 - 1.4
61	Naturita - Beaver Creeks	55,109	55,699	0 - 0.2
63	Upper San Miguel River	215,699	215,950	0.1 - 0.2
65	Horsefly - McKenzie Creeks	60,805	61,690	0.2 - 0.5
67	Tabeguache-Cottonwood Creeks	56,338	56,775	0.3 - 0.4
69	West Mesa Creek	51,226	51,517	0 - 0
71	Little Dolores River	2,863	2,863	0 - 0
73	East - Dominguez Creeks	38,179	38,363	0 - 0.1
75	Escalante Creek	51,555	51,855	0 - 0.1
77	Roubideau Creek	51,079	52,548	0.7 - 1.3
79	Uncompahgre River	205,229	206,587	0.8 - 1.3
81	Cimarron - Big Blue Creeks	150,230	151,117	0.2 - 0.4
83	Lake Fork Gunnison River	82,618	82,692	0 - 0.2
85	Cebolla - S. Beaver Creeks	119,119	119,254	0.3 - 0.5
87	Cochetopa Creek	108,376	111,503	0.5 - 0.8
89	Lower Tomichi Creek	46,261	47,307	0.3 - 0.4
91	Long Branch-Tomichi Creeks	71,541	72,109	0.2 - 0.9
93	Quartz Creek	64,811	65,473	0 - 0.9
95	Taylor Park Reservoir	126,378	127,076	0.3 - 1.2
97	Taylor River Canyon	88,893	89,351	0.2 - 1.0
99	East River	228,776	229,171	0.1 - 0.2

* Displays the range of increase over current water yield for the alternatives.

TABLE IV-32.

WATER YIELD SUMMARY BY NATIONAL FOREST SYSTEM WATERSHED
(Average Annual Water Yield Increase Over Current by 2030)

Watershed Number	Watershed Name	Water Yield		Range of Increase* (Percent)
		Baseline (Ac Ft Yr)	Current (Ac Ft Yr)	
01	Ohio Creek	102,219	102,393	0.3 - 0.7
03	Soap - Beaver Creeks	147,753	148,925	0.3 - 0.9
05	Smith Fork - Curecanti Creek	100,643	101,853	0.3 - 0.7
07	Anthracite - Coal Creeks	132,449	132,819	0.4 - 1.0
09	Muddy Creek	112,318	112,452	0.4 - 1.2
11	North Fork Gunnison River	99,289	99,616	0.3 - 1.0
13	Tongue - Currant Creeks	72,282	72,497	0.3 - 1.0
15	Kannah Creek	47,382	47,902	0 - 1.7
17	Plateau Creek	107,938	108,280	0.7 - 1.7
19	Buzzard Creek	53,307	53,631	0.1 - 0.9
61	Naturita - Beaver Creeks	55,109	55,699	0.1 - 0.7
63	Upper San Miguel River	215,699	215,950	0.1 - 0.2
65	Horsefly - McKenzie Creeks	60,805	61,690	0.6 - 1.1
67	Tabeguache-Cottonwood Creeks	56,338	56,775	0.3 - 0.5
69	West Mesa Creek	51,226	51,517	0.2 - 0.8
71	Little Dolores River	2,863	2,863	0 - 0
73	East - Dominguez Creeks	38,179	38,363	0.3 - 1.3
75	Escalante Creek	51,555	51,855	0.3 - 0.6
77	Roubideau Creek	51,079	52,548	1.0 - 2.1
79	Uncompahgre River	205,229	206,587	0.6 - 1.6
81	Cimarron - Big Blue Creeks	150,230	151,117	0.4 - 1.1
83	Lake Fork Gunnison River	82,618	82,692	0 - 0.1
85	Cebolla - S. Beaver Creeks	119,119	119,254	0.5 - 1.1
87	Cochetopa Creek	108,376	111,503	0.5 - 1.8
89	Lower Tomichi Creek	46,261	47,307	0.5 - 0.7
91	Long Branch-Tomichi Creeks	71,541	72,109	0.3 - 0.8
93	Quartz Creek	64,811	65,473	0 - 0.4
95	Taylor Park Reservoir	126,378	127,076	0.2 - 0.9
97	Taylor River Canyon	88,893	89,351	0.2 - 0.4
99	East River	228,776	229,171	0.1 - 0.3

* Displays the range of increase over current water yield for the alternatives.

In all alternatives, most of the projected water yield increase will result from clearcuts and road construction. In all Alternatives except 8, it is assumed that a group selection harvest method would be applied to 20% of the area and the remaining 80% would be shelterwood harvest methods. The groups would be small clearcuts for water production. In Alternative 8, the water augmentation alternative, 40% of the shelterwood harvest acres will have a group selection harvest method applied. Created openings associated with range and wildlife habitat improvement also increases water yield.

Table IV-30 displays the percent water yield increase potential achieved on tentatively suitable forest land on slopes less than 40% after 50 years. The alternatives range from 19 to 37 percent. Better markets for aspen will be required before larger quantities can be harvested economically. Much of the potentially suitable acreage, especially in the aspen type, is currently inaccessible by road.

The potential effects on downstream water availability is also in Table IV-30. Assuming average conditions, additional water production over current levels will range from 497,260 in Alternative 9 to 1,062,800 acre feet in Alternative 8 over the 50-year planning horizon. On the average, only about 12 to 15 percent of those increases will occur in the first decade.

Increased water yields will generally be spread out over the entire runoff cycle. The contributing factors are: peak snowmelt runoff increases due to greater amounts of snow being melted in clearcut openings, while late season flows will be augmented due to extra baseflow contributions from water no longer being transpired from soils in those same openings.

Most water not meeting water quality standards is affected by toxic metallic pollutants from past mining activity. No alternative will have any direct effect on improving these problems. Conversely, no alternative will directly increase pollution from mining sources. In all alternatives the Forest will cooperate with local, State, and other Federal agencies in improving water quality.

The primary pollutant that results from Forest management activities is sediment. Sediment may be introduced into stream channels from soil disturbing activity such as timber harvest, road construction, and mining. Sediment transport may be increased through increasing water yield.

Annual sediment increases are projected to range from .64 to 1.38 acre-feet per year in the first decade. In the water yield improvement activities of the fifth decade, the range is from 1.14 to 2.20 acre-feet per year. The cumulative sediment production over a 50-year horizon resulting from these activities range from 46 to 98 acre-feet. Normal mitigating measures are scheduled for disturbed areas to avoid excessive sediment production. Tables IV-33 and IV-34 summarize the sediment analysis by alternative.

TABLE IV-33.

SEDIMENT SUMMARY BY NATIONAL FOREST SYSTEM WATERSHED
(Acre Feet Per Year by 1990)

Watershed Number	Watershed Name	Range of Sediment Increase Over Current*
01	Ohio Creek	.03 - .05
03	Soap - Beaver Creeks	.02 - .05
05	Smith Fork - Curecanti Creek	.03 - .03
07	Anthracite - Coal Creeks	.01 - .01
09	Muddy Creek	.01 - .05
11	North Fork Gunnison River	.01 - .04
13	Tongue - Currant Creeks	.03 - .08
15	Kannah Creek	0 - .02
17	Plateau Creek	.04 - .13
19	Buzzard Creek	.01 - .07
61	Naturita-Beaver Creeks	.01 - .01
63	Upper San Miguel River	.01 - .04
65	Horsefly - McKenzie Creeks	.02 - .03
67	Tabeguache - Cottonwood Creeks	.02 - .03
69	West Mesa Creek	0 - .01
71	Little Dolores River	0 - 0
73	East - Dominguez Creeks	.01 - .01
75	Escalante Creek	.01 - .01
77	Roubideau Creek	.04 - .07
79	Uncompahgre River	.18 - .27
81	Cimarron - Big Blue Creeks	.02 - .05
83	Lake Fork Gunnison River	0 - .01
85	Cebolla - S. Beaver Creeks	.03 - .05
87	Cochetopa Creek	.06 - .09
89	Lower Tomichi Creek	.02 - .03
91	Long Branch - Tomichi Creeks	.02 - .06
93	Quartz Creek	.01 - .06
95	Taylor Park Reservoir	.04 - .16
97	Taylor River Canyon	.02 - .09
99	East River	.01 - .04

* Displays the sediment range determined by the alternatives considered in detail.

TABLE IV-34.

SEDIMENT SUMMARY BY NATIONAL FOREST SYSTEM WATERSHED
(Acre-Feet Per Year by 2030)

Watershed Number	Watershed Name	Range of Sediment Increase Over Current*
01	Ohio Creek	.03 - .08
03	Soap - Beaver Creeks	.04 - .12
05	Smith Fork - Curecanti Creek	.04 - .08
07	Anthracite - Coal Creeks	.05 - .13
09	Muddy Creek	.04 - .12
11	North Fork Gunnison River	.03 - .09
13	Tongue - Currant Creeks	.02 - .07
15	Kannah Creek	.01 - .07
17	Plateau Creek	.08 - .12
19	Buzzard Creek	.01 - .04
61	Naturita-Beaver Creeks	.01 - .04
63	Upper San Miguel River	.03 - .05
65	Horsefly - McKenzie Creeks	.03 - .06
67	Tabeguache - Cottonwood Creeks	.02 - .02
69	West Mesa Creek	.01 - .04
71	Little Dolores River	0 - 0
73	East - Dominguez Creeks	.01 - .04
75	Escalante Creek	.02 - .03
77	Roubideau Creek	.05 - .10
79	Uncompahgre River	.13 - .31
81	Cimarron - Big Blue Creeks	.05 - .13
83	Lake Fork Gunnison River	0 - .01
85	Cebolla - S. Beaver Creeks	.06 - .11
87	Cochetopa Creek	.05 - .19
89	Lower Tomichi Creek	.02 - .05
91	Long Branch - Tomichi Creeks	.02 - .04
93	Quartz Creek	.01 - .03
95	Taylor Park Reservoir	.03 - .10
97	Taylor River Canyon	.02 - .06
99	East River	.01 - .05

* Displays the sediment range determined by the alternatives considered in detail.

"HYSED" is a water resource analysis system designed to provide a way to quantify and predict the effects of certain management activities on stream channels. The "HYSED" analysis estimates water yield and sediment increase thresholds on a watershed. The threshold is that level of increase beyond which unacceptable resource damage (i.e., stream channel and water quality degradation) could be expected to occur. Thresholds are not likely to be reached and thus constrain management activities unless unstable stream channel systems, high road densities, and unusual clearcut concentrations occur in a watershed. For the analysis, the thirty National Forest System watersheds displayed in Tables IV-31 through IV-34 have been further subdivided into 285 "prescription" watersheds. These smaller watersheds average slightly over 10,000 acres and are generally drained by third to fourth order streams. The "HYSED" model, timber harvest and road construction acreage by alternative, and the alternative maps were used to identify prescription watersheds that could approach the threshold limits for water yield and sediment increases under the various alternatives. These "critical" watersheds may not be able to sustain their projected share of timber harvest and road construction over the 50-year planning horizon. A discussion of the "HYSED" model is displayed in the Forest planning records.

Under all alternatives, including the non-market alternatives (4 and 6), the watersheds displayed in Table IV-35 will likely approach the water yield or sediment threshold within the first two decades.

TABLE IV-35.

"CRITICAL" WATERSHEDS
(All Alternatives)

Name	Watershed Number
Chavez Creek	87-13
Pauline Creek	87-12
Red Creek	03-05
Goat Creek	61-03
Long Creek	77-07

A more site-specific analysis will be conducted for the above watersheds before any additional management activities occur, regardless of the alternative selected. No additional watersheds will likely reach the threshold limits within the 50-year planning horizon under alternatives 4 and 6.

Those watersheds displayed in Table IV-36 could reach the threshold limits during the 50-year planning horizon under alternatives 1, 2, 5, 7, 8, and 9; even though they are currently well below the limits.

TABLE IV-36.

"CRITICAL" WATERSHEDS
(Alternatives 1, 2, 5, 7, 8, and 9)

Name	Watershed Number
Raven Gulch	11-09
Little Red Canyon	65-03
Hanks Creek	65-04
East Fork Dry Creek	79-02
Trail Creek	95-01

Alternative 3 could result in threshold limits being reached during the planning horizon in the watersheds displayed in Table IV-37.

TABLE IV-37.

"CRITICAL" WATERSHEDS
(Alternative 3)

Name	Watershed Number
Crystal Creek	05-07
Meyers Gulch	05-09
Raven Gulch	11-09
Dry Fork Minnesota Creek	11-10
Owns Creek	19-05
Travers Creek	77-06
East Fork Dry Creek	79-02
Middle Fork Spring Creek	79-03
East Fork Spring Creek	79-04
Hot Springs Creek	89-03
Trail Creek	95-01

Water quality monitoring and other studies would continue under all alternatives to verify and refine the assumptions and procedures used in predicting the Forest management impacts on water quality. The watersheds previously displayed were given special attention in developing water yield and water quality monitoring plans and objectives. If monitoring indicates that the threshold level has been approached or exceeded, and that unacceptable resource impacts may or have occurred, it will be necessary to limit further activity in the watershed until hydrologic recovery takes place (through watershed improvement work and vegetation regrowth). Output levels can be maintained by all alternatives by transferring activity to other, less impacted watersheds. Under all alternatives activities resulting in water yield increases will be planned only in watersheds with the potential for producing more water without detrimental effects on stream channel stability and water quality. Other impacts on the water resource are discussed under the Timber, Range, and Fish and Wildlife sections of this chapter.

No significant adverse effects on wetlands or floodplains are anticipated. Floodplains and wetlands will be protected in all alternatives through direction displayed in the Plan, Chapter III, Forest Direction Management Requirements and by riparian management displayed in the Forest Plan. Wetland protection (as required by Executive Order 11990) will be provided by ensuring that new construction of roads, campgrounds, buildings and other facilities will not have unacceptable adverse effects on wetlands. In addition, wetland evaluation will be required prior to issuing special use permits in areas where conflicts with wetland ecosystems may occur. Specific standards and guidelines were designed to conserve riparian areas and protect floodplain values (as required by Executive Order 11988). Protective measures for riparian areas include buffer strips, stream channel stability maintenance, instream flow maintenance, and timber management that meets wildlife, visual and riparian ecosystem goals. Floodplains will be managed by locating critical facilities out of floodplains or by using structural mitigation measures (e.g., deflection structures, rip rap). Floodplain "parity" will be maintained in land exchanges.

Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area

In both Cannibal Plateau FPA and Fossil Ridge WSA the geographic configuration and limited water sources would tend to concentrate visitors along the few water bodies and riparian areas. This could make these areas susceptible to soil erosion and compaction in any alternative. Riparian areas open to livestock grazing would also be susceptible to soil erosion and compaction in any alternative. Mitigation measures could be needed to prevent water pollution. Mitigation measures available will either detract from the wilderness experience or limit opportunities for public access. Water quality should remain the same in all alternatives.

Alternatives A, B and C would not have any significant impact on the water resources of the FPA or WSA.

Vegetation treatments in alternative D of both the WSA and FPA could degrade water quality through increased sedimentation. Mitigation measures in the Forest Plan, Chapter III, ensure water quality meets appropriate standards.

Vegetation treatments in alternative D of both the WSA and FPA can increase water yields. Vegetation can be treated in several ways to reduce evapotranspiration and increase water yield. The most effective method relies on clear-cutting small five to ten acre areas. These small clearcuts reduce vegetation evapotranspiration and at the same time allow blowing snow to be deposited in the small clearcuts. This reduces snow evaporation losses.

Alternatives B and C would effectively preclude future vegetation treatment activities in the WSA or FPA with the exception of the unsuitable portion of alternative B. Many activities require vehicular access. Snowpack management activities, such as snow fences or similar structures, would be incompatible with the area's wilderness character.

Vegetation treatments in alternative D could increase the water pollution risk. Natural ecosystems have developed buffering capabilities over the years that may be overcome once land disturbance has taken place. This is especially true in fragile alpine ecosystems. Alternatives B and C will minimize this increased risk of pollution.

All alternatives will not affect any existing or proposed water uses.

MINERALS

Demand for access to National Forest System lands for the purposes of mineral exploration and development is expected to continue to increase over the long term. Most National Forest System lands are available for mineral activities and requests for access must be processed in a timely manner. Proposals involving mineral activities are processed as prescribed by applicable laws, regulations, and policies. See Chapter III, Minerals, for discussion of applicable laws, regulations, and policy.

Management requirements for minerals in the Forest Plan (Chapter III, Management Direction) are based on statutory and regulatory direction for locatable, leasable, and salable minerals. Also considered are statutory and other management criteria for surface protection appropriate to the lands involved to prevent or control adverse environmental impacts. The mineral-related management requirements (Forest Plan, Chapter III, Management Direction) are presented in three categories to cover environmental impacts typically associated with exploration and development operations for the various mineral commodities.

The first category is Mining Law Compliance and Administration (Forest Plan, Chapter III, Management Direction) for locatable minerals. Access to lands open to operations under the General Mining Laws is a statutory right granted by Congress. The Forest Service reviews proposed plans of operations to ensure that operations will meet Federal environmental protection standards. These standards include those for air and water as prescribed by Federal and State laws and regulations. In addition, the plan of operation must provide for prompt reclamation or restoration of disturbed lands, to the degree practicable, for the planned uses of the area.

The remaining two categories, Mineral Management Oil, Gas and Geothermal (Forest Plan, Chapter III, Management Direction) and Minerals Management Coal, Leasable Uranium, Non-Energy, Common Mineral Materials (Forest Plan, Chapter III, Management Direction) cover leasable and salable minerals. For these two categories, reasonable access to Forest lands is also guaranteed once the discretionary decision is made to issue a lease, permit, or license allowing surface use and occupancy. Permits are issued by the Forest Service for initial geophysical prospecting (seismic operations for oil and gas, shallow drilling for geothermal temperature gradient measurement, and geologic investigations for solid minerals). Permits are for the land uses only and grant no rights to the permittees to the minerals involved. The Forest Service has total discretion for disposal of common (salable) varieties of mineral materials. The BLM issues all other leases, licenses, or permits for exploratory drilling and production of valuable leasable minerals.

BLM proposals to issue a license, permit, or lease for leasable minerals in National Forest System lands are forwarded to the Forest Service asking whether or not the lands are available for mineral exploration and development. If the lands are determined by the Forest Service to be available, standard and special stipulations necessary for the management of the surface resources are identified. Management direction for leasable minerals as to availability ("lease" or "no lease"), and surface resource management stipulations for lands available for leasing, are part of the management requirements (Forest Plan, Chapter III, Management Direction).

Recommendations for availability of lands for mineral leasing are based on whether oil and gas development activities could be implemented on National Forest System land and meet the management requirements for minerals in the Forest Plan. The mineral management requirements reflect surface resource protection and restoration requirements. Within designated wilderness and Wilderness Study Areas, only those lands which can be restored to near-natural conditions will be available for leasing with surface occupancy. The specific leasing decisions, however, would be considered only when proposals to lease are received.

Secondary mineral processing, other than concentration (milling), and energy conversion facilities will be prohibited in wilderness. Special areas, such as research natural areas and archaeological areas, can only be recommended for leasing without surface occupancy since disturbance of the surface resources would damage the special characteristics of the land for which they were classified.

Mineral management requirements that apply to unclassified National Forest System land, are different than those for classified lands. Availability of unclassified lands for mineral leasing with surface occupancy is based on whether reclamation, following abandonment of the operation, can be accomplished within the uses and direction set forth in the Forest Plan.

Oil, gas and geothermal resource exploration and development involve the construction and use of roads, pipelines, drill pads, and the ancillary facilities necessary for development, production, and transportation. The major on-site physical and biological impacts of these activities are soil erosion, water pollution, and air pollution. (See the Soils; Water; and Protection, Air Quality sections of this chapter).

Other mineral and mineral materials exploration, development, and production will also have impacts associated with the construction and use of roads, powerlines, and other necessary ancillary facilities, overburden and waste removal and placement for surface or underground mining, and concentrating mills. The major potential on-site physical and biological environmental impacts of these activities would be soil erosion and air and water pollution.

Should operations be approved in wilderness, there would be impacts upon the wilderness characteristics of solitude and on the pristine character of the land. The impact on solitude is limited to the duration of the mineral exploration and development activities. The duration of the impact upon the pristine character of the lands will last until natural vegetation and appearance are restored.

Some adverse impacts can be expected from minerals exploration, regardless of the alternative implemented. These impacts may include road or trail construction for access to valid claims, vegetation disturbance during exploration or development, degraded air quality, reduced water quality, and wildlife disturbance. Environmental assessments for specific projects will consider the protection of surface resources and will be tiered to the proposed Plan and Draft EIS.

Positive impacts include the fact that local roads are currently being constructed primarily in conjunction with timber and mineral resource activities. These local roads access areas that are compatible with multiple resource and management uses. Roads are also discussed in the Facilities section of this chapter.

A Federal mineral leasing charge is assessed on oil and gas leases. Fifty percent of this money is paid to the State and redistributed through Energy Impact Assistance to county and local governments. Minerals exploration and development provides primary and secondary employment to the local and regional economy.

Operating plans will include provisions to minimize adverse environmental impacts on surface resources in all alternatives. The requirements for air quality, water quality, solid waste disposal, scenic values, fisheries and wildlife habitat, roads, and reclamation will also be incorporated. Reasonable conditions for protection will be imposed. Table IV-38 displays the number of operating plans expected to be processed by time period for each alternative.

TABLE IV-38.

ESTIMATED OPERATING PLANS PROCESSED
(Average Annual Number of Plans)

Alternative	Time Period					
	1981- 1985	1986- 1990	1991- 2000*	2001- 2010	2011- 2020	2021- 2030
Mineral Leases and Permits						
1, 3	110	118	136	156	182	184
2, 5, 7, 8	120	150	150	150	150	150
4, 6	110	130	130	130	130	130
9	50	50	50	50	50	50
Locatable Minerals						
1, 2, 3, 5, 7, 8	85	100	100	100	100	100
4, 6	80	90	90	90	90	90
9	50	50	50	50	50	50

The BLM is responsible for mineral leasing. The Forest recommends the BLM either consent to or deny the lease application. The Forest established mineral leasing criteria to identify land to be recommended available for leasing with surface occupancy, leasing without surface occupancy, and unavailable for mineral leasing. The BLM is responsible for environmental analysis of activities on mineral leases. Cooperation with BLM insures that data developed in the Forest planning process is available for their analysis. Lease issuance on National Forest System land, on which a "No-Surface-Occupancy" applies does not guarantee access across National Forest System land. In addition, lease issuance does not guarantee access across adjacent land which is not part of the National Forest System. The Forest Service will coordinate recommendations with contiguous land owners.

In all alternatives approximately 755,862 acres have been identified having "high" to "moderate" suitability for coal leasing through application of the BLM Coal unsuitability criteria; 224,491 acres of the suitable acres were assessed as unsuitable for coal leasing. Appendix F details the unsuitability assessment for coal mining using the BLM's unsuitability criteria.

Minerals Management in wilderness areas is an issue addressed by the alternatives. In Alternative 2, the Forest recommends no area is available for mineral leasing in existing wilderness areas, Cannibal Plateau Further Planning Area and Fossil Ridge Wilderness Study Area. All other alternatives recommend 283,513 acres in existing wilderness areas are unavailable for mineral leasing.

Alternatives 4 and 7 recommend 3,425 acres in Cannibal Plateau and 337 acres in Fossil Ridge unavailable for mineral leasing. Alternatives 1, 6, and 8 recommend 2,479 acres in Cannibal Plateau and no acres in Fossil Ridge unavailable for mineral leasing. Alternatives 2, 3, 5, and 9 do not identify Cannibal Plateau or Fossil Ridge suitable for wilderness.

If leases go into full development, major surface impacts will be experienced. Wells could be in a half-mile grid pattern. Roads, pipelines, pumping stations, and other developments will be required. Surface impacts and mitigation measures will be analyzed when the operating plans and applications for permits are presented. Measures will be designed to meet the management area direction for the areas involved. Road closures and travel restrictions will be utilized to comply with management area direction. Where impacts on big game are significant, mitigation, in the form of off-site habitat improvement could be required.

Effects of mineral exploration and development in wilderness areas and areas identified suitable for wilderness will not change in alternatives 1, 3, 4, 5, 6, 7, 8, and 9. Leases issued for land which is part of the National Wilderness Preservation System would include reasonable stipulations required by Section 4(d)(3) of the Wilderness Act. Leases issued for land which is identified for addition to the National Wilderness Preservation System would include protective stipulations. Protection and restoration of disturbance to the biological and physical resources of wilderness will be emphasized in all alternatives.

The Colorado Open Space Council and The National Audubon Society propose a 40% slope limit on mineral leasing recommendations to prevent erosion, soil loss and stream degradation. The criteria used by the Forest are sufficient to prevent these impacts from occurring.

Table IV-39 displays land recommended available for mineral leasing. This includes existing wilderness, non-wilderness, Cannibal Plateau Further Planning Area, and Fossil Ridge Wilderness Study Area.

Table IV-40 displays land recommended available for mineral leasing for Cannibal Plateau Further Planning Area and Fossil Ridge Wilderness Study Area.

Differences in leasing recommendations between alternatives are the result of the differing alternative goals. The primary source of differing recommendations pertains to the recommendations of Cannibal Plateau Further Planning Area and Fossil Ridge Wilderness Study Area in each alternative.

Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area

Mineral exploration and development can occur regardless of alternative in WSA or FPA. National Forest System land is available for mineral activities and requests for access must be processed in a timely manner. Proposals involving mineral activities are processed as prescribed by applicable laws, regulations and policy. The reader is encouraged to review the Forest's role in minerals management as displayed in Chapter III, Minerals section. Alternatives B and C place additional stipulations on mineral activities, thereby increasing costs for the mineral activities.

Management requirements for minerals in all alternatives are based on statutory and regulatory direction for locatable, leasable and salable minerals. These management requirements are displayed in the Forest Plan, Chapter III, Forest Direction.

Mineral activities could impact the wilderness character of the WSA and FPA. The WSA's and FPA's wilderness character would probably not be maintained if mineral activities occurred. Impact on wilderness character from mineral exploration and development will be analyzed through the environmental analysis process as operating plans are received regardless of alternatives. Mitigation measures ensure the land's characteristics would be rehabilitated but not necessarily restored.

Mineral exploration and development can impact vegetation, recreation, wilderness, fish and wildlife, range, timber, water and other resources in the WSA and FPA. Impacts on these resources will be dealt with on a project-by-project basis as operating plans are received through the environmental analysis process regardless of alternatives.

In alternative C and the suitable portion of alternative B, the WSA and FPA would be withdrawn from mineral activities on December 31, 1983; subject to existing rights.

TABLE IV-39.

LAND AVAILABLE FOR MINERAL LEASING
(Total National Forest System Land Disclosed in this Final EIS)

Alternative - Leasing Availability Recommendations	Non-wilderness**									
	All Wilderness*		Semi-primitive Non-motorized		Other		Total		Grand Total	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
ALTERNATIVE 1										
No Lease	285,992	62	62,735	13	122,759	7	185,494	8	471,486	16
Lease	76,418	16	355,006	74	1,686,631	85	2,041,637	83	2,118,055	73
Lease Without Surface Occupancy	104,807	22	64,659	13	146,020	8	210,679	9	315,486	11
TOTAL	467,217	100	482,400	100	1,955,410	100	2,437,810	100	2,905,027	100
ALTERNATIVE 2										
No Lease	453,618	100	54,943	13	196,277	11	251,220	11	704,838	24
Lease	0	0	314,924	75	1,696,446	82	2,011,370	81	2,011,370	69
Lease Without Surface Occupancy	0	0	50,633	12	138,186	7	188,819	8	188,819	7
TOTAL	453,618	100	420,500	100	2,030,909	100	2,451,409	100	2,905,027	100
ALTERNATIVE 3										
No Lease	283,513	62	60,245	13	124,270	7	184,515	8	468,028	16
Lease	70,768	16	340,913	74	1,725,779	85	2,066,692	84	2,137,460	74
Lease Without Surface Occupancy	99,337	22	62,092	13	138,110	8	200,202	8	299,539	10
TOTAL	453,618	100	463,250	100	1,988,159	100	2,451,409	100	2,905,027	100
ALTERNATIVE 4										
No Lease	287,275	54	47,634	12	130,892	7	178,526	8	465,801	16
Lease	129,633	24	308,153	76	1,690,842	85	1,998,995	84	2,128,628	73
Lease Without Surface Occupancy	116,100	22	48,413	12	146,085	8	194,498	8	310,598	11
TOTAL	533,008	100	404,200	100	1,967,819	100	2,372,019	100	2,905,027	100
ALTERNATIVE 5										
No Lease	283,513	62	56,764	13	129,348	7	186,112	8	469,625	16
Lease	70,768	16	322,288	75	1,730,957	85	2,053,245	84	2,124,013	73
Lease Without Surface Occupancy	99,337	22	52,348	12	159,704	8	212,052	8	311,389	11
TOTAL	453,618	100	431,400	100	2,020,009	100	2,451,409	100	2,905,027	100

TABLE IV-39. (Cont.)

Alternative - Leasing Availability Recommendations	Non-wilderness**									
	All Wilderness*		Semi-primitive Non-motorized		Other		Total		Grand Total	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
ALTERNATIVE 6										
No Lease	285,992	57	48,128	12	130,103	7	178,231	8	464,223	16
Lease	105,230	21	311,355	16	1,721,484	85	2,032,839	84	2,138,069	74
Lease Without Surface Occupancy	110,295	22	48,917	12	143,523	8	192,440	8	302,735	10
TOTAL	501,517	100	408,400	100	1,995,110	100	2,403,510	100	2,905,027	100
ALTERNATIVE 7										
No Lease	287,275	54	35,746	9	137,412	7	173,158	8	460,433	16
Lease	129,633	24	324,799	80	1,664,923	85	1,989,722	83	2,119,355	73
Lease Without Surface Occupancy	116,100	22	48,405	11	160,734	8	209,139	9	325,239	11
TOTAL	533,008	100	408,950	100	1,963,069	100	2,372,019	100	2,905,027	100
ALTERNATIVE 8										
No Lease	285,992	62	44,882	11	131,334	7	176,216	8	462,208	16
Lease	76,418	16	308,581	75	1,744,804	85	2,053,385	83	2,129,803	73
Lease Without Surface Occupancy	104,807	22	58,887	14	149,322	8	208,209	9	313,016	11
TOTAL	467,217	100	412,350	100	2,025,460	100	2,437,810	100	2,905,027	100
ALTERNATIVE 9										
No Lease	283,513	62	40,688	9	133,574	7	174,262	7	457,775	16
Lease	70,768	16	397,841	83	1,670,576	84	2,068,417	84	2,139,185	74
Lease Without Surface Occupancy	99,337	22	39,371	8	169,359	9	208,730	9	308,067	10
TOTAL	453,618	100	477,900	100	1,973,509	100	2,451,409	100	2,905,027	100

* Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area are included only when recommended suitable for wilderness classification in that alternative.

** Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area are included only when recommended unsuitable for wilderness classification in that alternative.

TABLE IV-40.

LAND AVAILABLE FOR MINERAL LEASING
(Wilderness Study Area and Further Planning Area)

Alternative - Leasing Availability Recommendations	Cannibal Plateau Further Planning Area				Fossil Ridge Wilderness Study Area			
	Wilderness Recommendation Suitable		Unsuitable		Wilderness Recommendation Suitable		Unsuitable	
	Acres	%	Acres	%	Acres	%	Acres	%
ALTERNATIVE 1								
No Lease	2,479	18	946	5	0	0	337	1
Lease	5,650	42	13,146	72	0	0	40,069	84
Lease Without Surface Occupancy	5,470	40	4,299	23	0	0	6,994	15
TOTAL	13,599	100	18,391	100	0	0	47,400	100
ALTERNATIVE 2								
No Lease	0	0	31,990	100	0	0	47,400	100
Lease	0	0	0	0	0	0	0	0
Lease Without Surface Occupancy	0	0	0	0	0	0	0	0
TOTAL	0	0	31,990	100	0	0	47,400	100
ALTERNATIVE 3								
No Lease	0	0	3,425	11	0	0	337	1
Lease	0	0	18,796	59	0	0	40,069	84
Lease Without Surface Occupancy	0	0	9,769	30	0	0	6,994	15
TOTAL	0	0	31,990	100	0	0	47,400	100
ALTERNATIVE 4								
No Lease	3,425	11	0	0	337	1	0	0
Lease	18,796	59	0	0	40,069	84	0	0
Lease Without Surface Occupancy	9,769	30	0	0	6,994	15	0	0
TOTAL	31,990	100	0	0	47,400	100	0	0
ALTERNATIVE 5								
No Lease	0	0	3,425	11	0	0	337	1
Lease	0	0	18,796	59	0	0	40,069	84
Lease Without Surface Occupancy	0	0	9,769	30	0	0	6,994	15
TOTAL	0	0	31,990	100	0	0	47,400	100

TABLE IV-40. (Cont.)

Alternative - Leasing Availability Recommendations	Cannibal Plateau Further Planning Area				Fossil Ridge Wilderness Study Area			
	Wilderness Recommendation		Wilderness Recommendation		Wilderness Recommendation		Wilderness Recommendation	
	Suitable		Unsuitable		Suitable		Unsuitable	
	Acres	%	Acres	%	Acres	%	Acres	%
ALTERNATIVE 6								
No Lease	2,479	18	946	5	0	0	337	3
Lease	5,650	42	13,146	72	28,812	84	11,257	86
Lease Without Surface Occupancy	5,470	40	4,299	23	5,488	16	1,506	11
TOTAL	13,599	100	18,391	100	34,300	100	13,100	100
ALTERNATIVE 7								
No Lease	3,425	11	0	0	337	1	0	0
Lease	18,796	59	0	0	40,069	84	0	0
Lease Without Surface Occupancy	9,769	30	0	0	6,994	15	0	0
TOTAL	31,990	100	0	0	47,400	100	0	0
ALTERNATIVE 8								
No Lease	2,479	18	946	0	0	0	337	1
Lease	5,650	42	13,146	0	0	0	40,069	84
Lease Without Surface Occupancy	5,470	40	4,299	0	0	0	6,994	15
TOTAL	13,599	100	18,391	0	0	0	47,400	100
ALTERNATIVE 9								
No Lease	0	0	3,425	11	0	0	337	1
Lease	0	0	18,796	59	0	0	40,069	84
Lease Without Surface Occupancy	0	0	9,769	30	0	0	6,994	15
TOTAL	0	0	31,990	100	0	0	47,400	100

HUMAN AND COMMUNITY DEVELOPMENT

Human resource programs on the Forest are affected more by the budgetary restrictions of other agencies than the resource management alternative selected. Implementation of any alternative including any alternative for Fossil Ridge WSA and Cannibal Plateau FPA, provides an opportunity to contribute to human and community development programs. These include activities that provide youth with resource conservation work and related learning experiences. Examples of these activities include the Youth Conservation Corps (YCC) and the Young Adult Conservation Corps (YACC). Adult employment and training programs, such as the Senior Community Service Employment Program and the Comprehensive Employment Training Act (CETA), are also provided. These programs help ensure equal employment opportunities for women, minorities, the elderly, and the handicapped.

PROTECTION

Fire ignitions are expected to increase under all alternatives with the predicted population growth and proportionate increases in Forest visitor use. Alternatives 1, 3, 5, 7, and 8, which emphasize market outputs from management activities will cause a reduction of accumulated fuels which could maintain the fire hazard at a low enough level to off-set the increased risk. Alternatives 2, 4, 6, and 9; emphasizing non-market outputs will result in an increase of natural fuel accumulations over time.

Prescribed burning to support management objectives changes somewhat by alternative. Benefits derived from prescribed burning span several resources with the greatest share of the costs borne by resources other than fire management. Fire prevention benefits are greatest where prescribed burning is used in tree cover. Fuel reductions from prescribed burning in brush and browse vegetation enhances fire protection also. Prescribed burning prepares the site for regeneration needs, creates the edge needed for wildlife, and provides the nitrogen nutrients needed for establishment of grasses and forbs. Burning also improves the vigor and production of forage and decreases the amount of unwanted vegetation. Prescribed burning is further discussed in the Fish and Wildlife and Range sections of this chapter.

Table IV-41 summarizes the amount of activity fuel treatment by alternative. Fuel treatment can include broadcast burns, yarding unmerchantable material, dozer piling and burning, dozer scattering, hand piling and burning, lopping and scattering, and opening the area to firewood cutters. Activity fuel treatments are applied to fuels generated from resource management activities. Alternatives 1, 3, 5 and 8 can increase the amount of activity related fuels. Alternatives 2, 4, 6, 7 and 9, decrease the amount of activity related fuels. Alternatives 1, 3, 5 and 8; although increasing activity fuels; provide additional firewood available to the public. Brush disposal plans mitigate unacceptable increases in activity fuels in all alternatives.

TABLE IV-41.

ACTIVITY FUEL TREATMENT
(Thousand Acres, Average Annual)

Time Period	Alternative				
	1,3	2,7	4,6	5,8	9
1981-1985	1.9	2.5	2.0	3.0	0.2
1986-1990	1.8	3.0	2.5	3.5	0.2
1991-2000	2.0	3.0	2.5	3.5	0.2
2001-2010	1.6	3.0	2.5	3.5	0.2
2011-2020	1.6	3.0	2.5	3.5	0.2
2021-2030	1.6	3.0	2.5	3.5	0.2

On areas managed with prescribed burning, wildfire intensities will tend to be lower and less damaging. Unintentionally ignited fires burning within prescribed conditions may be allowed to burn within containment boundaries when land management objectives can be served by the burn. This will occur primarily in ponderosa pine and oakbrush.

Effects upon the total fire protection program between alternatives is not significant. A "Level I" analysis has been conducted for the Forest's fire management program. This analysis indicated that even though the Forest has not been funded at the cost-efficient level established by the 1979 Fire Protection Budget Analysis, the Forest has not experienced a serious wildfire problem. For these reasons a Level II analysis will not be conducted.

Reconnaissance surveys and evaluation of insect and disease conditions will be conducted in all alternatives. Table IV-42 displays the insect and disease surveys by alternative. The degree of suppression actions will also vary between alternatives.

TABLE IV-42.

INSECT AND DISEASE SURVEYS
(Thousand Acres, Average Annual)

Time Period	Alternative				
	1,2 3,8	4,6	5	7	9
1981-1985	5.0	6.0	5.0	5.0	0
1986-1990	4.0	8.0	4.0	10.0	0
1991-2000	4.0	8.0	3.0	4.0	0
2001-2010	4.0	8.0	3.0	4.0	0
2011-2020	4.0	8.0	3.0	4.0	0
2021-2030	4.0	8.0	3.0	4.0	0

The long range goal of insect and disease management is prevention and suppression through vegetation treatment of susceptible stands. This is based on the premise that susceptibility of trees to insects and disease is primarily determined by age and tree vigor. Vegetation treatments which remove over-mature trees and reduce competition due to overstocking, as well as actual removal of infested trees, tend to increase the vigor of the residual trees and increase resistance to insects and disease.

Currently 17% of the Forest is in old growth condition. Eleven percent of the old growth (311,000 acres) is on land tentatively suitable for timber production. Old growth is scheduled for harvest on suitable timberland except where needed to meet wildlife habitat, visual or other management objectives.

Stand age and species diversity are also important factors in the susceptibility of a forest to insect and disease damage. The greater the diversity of ages and species the more resistant a forest is to damage from any one particular pest. Proper timber management of a forest provides for a distribution of stand ages and species.

Insects and disease are a part of the natural forest environment and they will continue to fill their role as agents of change in the ecological process. Tree mortality will continue to occur under all management alternatives, particularly in areas where access, topography or other resource values preclude timber management. Whether or not this tree mortality is considered as a loss or just natural change must depend upon the objectives of forest management and ones point of view.

Under all alternatives the majority of the forested lands will not receive vegetation treatment during the next five decades. This includes wilderness where insects and diseases are an integral part of the natural environment. In addition, there are young, vigorous stands of trees which will not require vegetation treatment until sometime after 2030. However, there are numerous

areas on the Forest which will not receive vegetation treatment and will continue to sustain tree losses due to insects and disease. There are no economically feasible methods of preventing these losses.

Insects and disease impact the timber resource in all alternatives. Alternatives 1, 3, 5, 6, and 8 which provide for full management of suitable timber lands will have less potential problem. Natural ecological losses will be reduced on land suitable for timber production. Aggressive action would be taken to suppress insect and disease conditions. Most trees will be harvested before they die from insect and disease attack.

Unmanaged old growth timber is more susceptible to epidemic insect attacks than managed timber. Increased insect and disease resistance results from a younger, healthier, and more vigorous forest accomplished through vegetation treatment. Salvage may take place on land not allocated to wilderness and non-motorized recreation use.

The most active insect and disease control activities would normally be accomplished under alternatives emphasizing market outputs. In Alternatives 2, 4, 7, and 9 emphasizing non-market outputs, normal insect and disease populations would be left to natural ecological forces. Therefore, the risk factor between alternatives for losses due to insect and disease is directly proportional to the allowable sale quantity for each alternative.

Management under all alternatives would maintain air quality above standards. Alternatives 1, 3, 5, 7, and 8; emphasizing vegetation treatment or market outputs including timber harvest and wildlife habitat improvement; would have a greater affect than alternatives emphasizing non-market outputs. Smoke is produced by logging slash burning and prescribed burns. These activities control brush, increase forage production, and produce smoke during short periods of good burning conditions in the spring and fall. All prescribed burning under any alternative is conducted under Colorado air quality regulations.

Air quality is affected by an activity such as dust created by vehicular travel on roads, road construction and cattle trailing on a short-term local basis. The only significant effect which is the result of planned activities occurs as the result of prescribed burning. All prescribed burning is conducted under Colorado air quality regulations.

Under the Prevention of Significant Deterioration provisions of the Clean Air Act, Congress established a land classification scheme for areas of the county with air exceeding standards. Class I allows very little additional deterioration of air quality; Class II allows more deterioration; and Class III allows still more. All areas of the Forest are currently classified as Class II, except portions of the West Elk Wilderness and the La Garita Wilderness which are Class I. No alternative will affect the classification of any portion of the Forest. Areas recommended for wilderness under some of the alternatives would retain their Class II designation.

The Regional Forester is responsible for analyzing air pollution impacts on air quality related values for those sources subject to the Prevention of

Significant Deterioration (PSD) regulations (Clean Air Act of 1977, as amended). This analysis will include a determination of impacts on visibility. Secondary mineral processing, energy conversion facilities, and oil and gas treatment facilities will be prohibited in wilderness. Therefore, it is highly unlikely that any source will be developed within a wilderness that will be subject to PSD.

Air pollution impacts likely to occur from exploration and development within wilderness and unclassified areas are displayed in Table IV-43.

TABLE IV-43.

AIR POLLUTION IMPACTS FROM MINERAL EXPLORATION AND DEVELOPMENT

Impacts	Source
Fugitive dust	Unpaved roads; Exposed areas; Drilling and blasting Stockpiles; and waste piles. Loading and hauling. Mechanical disturbance.
Odor	Vehicle emissions; Fuel storage; Leaks in valves, etc.; Emergency venting.

Mitigation measures for fugitive dust include watering, oiling, applying dust suppressent, paving, covering, and operating techniques.

Mitigation measures for controlling odors include proper maintenance and controls on all gas vents.

All air pollution sources within wilderness area will be required to use Best Available Control Technology (BACT).

Best Available Control Technology determinations include a review of environmental impacts. In areas that have special environmental characteristics (such as wilderness or natural areas), strict mitigation measures can be required by the Forest Service.

The determination of BACT will be done in a site specific analyses for individual operating plans. State air quality regulating authorities and EPA will be consulted in determining BACT.

After appropriate mitigation measures have been applied, the remaining air quality impacts resulting from exploration and development activities on NFS lands will be minor amounts of fugitive dust and odor.

Before any oil and gas development activities can begin on leased lands, the lease holder must submit a proposed operating plan to the Forest Service for review and approval. During the review, the Forest Service will determine if air pollution resulting from activities on Federal land will comply with the applicable State Implementation Plan (Section 176(c), Clean Air Act of 1977, as amended).

Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area

No alternative for the WSA or FPA will significantly impact the protection support element. Vegetation treatments in alternative D could reduce fire suppression costs in the WSA or FPA.

No alternative will have a significant impact on air quality. In Cannibal Plateau and Fossil Ridge, alternatives A, B and C, the forested areas would be subject to greater risk of insect and disease infestation and thus threaten neighboring stands. In alternative D, risk of insect and disease infestations would be lessened because vegetation treatments would thin stands and remove high risk trees. Mistletoe infections would be reduced and overall vigor of the forest would be improved.

Additional discussion of pest management is located under the Timber section of this chapter.

LANDS

Land exchange will be used to make adjustments in ownership when it is in the public interest. There are about 1,170 private acres within existing wilderness areas on the Forest. Those exchanges which result in the greatest public benefit will be given highest priority. The priority will be determined in part by the management emphasis of the adjacent land in the alternative selected. The number of acres exchanged is more dependent on the Forest's funding to process the exchanges than on the alternative selected. Rights-of-way acquisition and landline location programs will vary in size to meet the management emphases of each alternative. Trespass problems will be resolved as they are identified. Table IV-44 summarizes the lands program by alternative.

The designation of new utility corridors will be studied on a case-by-case basis regardless of alternative, but will be consistent with the plans and programs of other agencies. Impacts such as unsightly appearances, site disturbances, and conflicts with other Forest uses could occur. The Rocky Mountain Regional Guide establishes standards and guidelines to be used by the Forest in activities related to utility corridors. The management requirements in the Plan include measures to mitigate potential soil, water, visual, and land use impacts. Expanding compatible uses in existing corridors is emphasized over new corridor development. Development and growth on the western slope of Colorado will require additional transmission capacity and transmission lines may cross National Forest System land. The permitting and NEPA processes to be followed when authorizing use and occupancy are located in Forest Service Manuals.

Management Area allocations in each alternative identify areas where utility corridor designation could be considered, areas to be avoided and areas where corridors are not permitted. For instance utility corridors cannot be designated in wilderness unless authorized by the President. Other areas where corridors are not suitable include Research Natural areas and Wild and Scenic Rivers. Corridors should generally avoid the following management areas unless studies indicate that the impact of the corridor can be mitigated:

- Developed recreation sites and winter sports sites (Prescriptions 1A and 1B);
- Prescription 3B emphasizing primitive recreation in unroaded areas;
- Riparian areas (Prescription 9A); and
- Experimental Forests, Special Interest Areas and Municipal Water Supply and Municipal Watersheds (Prescriptions 10B, 10C and 10E).

Corridors can be considered for designation in all other management areas.

The alternative maps can be used to identify areas of the Forest that are generally considered "Open" for utility corridors, areas that would be "avoided" and areas that are not suitable relative to each alternative. The table "Acreage Allocation by Management Area Prescription for each Alternative" in Final EIS, Chapter II, can be used to determine acreages in "Open", "Avoidance", and "Suitable" by Alternative.

The use of National Forest System land for electronic sites has increased because of past high fossil fuel costs and shortages. Applications for electronic uses have been received and permits issued to a radio station for the newly designated Mesa Point Electronic Site. Two more commercial radio stations have expressed that they will apply for electronic site permits on Mesa Point. Greyhead Mountain near Telluride has been designated as an electronic site and an audio-visual supply company will develop the site under permit. The services provided at both proposed sites are important for the convenience and safety of the public. The permitting and NEPA processes to be followed when authorizing improvements are found in the Forest Service Manual.

Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area

There are five non-contiguous blocks of patented mining claims in the Fossil Ridge WSA. There is no private land in the Cannibal Plateau FPA. High priority for exchange would be given to the private land in alternatives B and C for the WSA. Low priority would be given in alternatives A and D. The number of acres exchanged is more dependent on the Forest's funding to process the exchanges than on the alternative selected.

Alternatives B and C would prohibit electronic sites and utility corridors in the WSA and FPA. Alternatives A and D would permit them. No alternative would have a significant impact on special use permits in the WSA or FPA. However, the special use permit for the electronic site in Cannibal Plateau FPA would be canceled in alternative C.

TABLE IV-44.

LANDS PROGRAM
(Average Annual)

Action/ Alternative	Time Period					
	1981- 1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
Land Exchange (Offered Acres) All Alternatives	800	320	240	240	240	240
	Acquisition acreage will be about evenly split between priority classes I and II, but will vary somewhat due to resource management emphasis.					
Right-of-Way Acquisition (Cases) Alternatives						
1, 2, 3, 5, 8	10	15	8	8	7	7
4, 6, 9	10	7	7	7	7	7
7	6	7	7	7	7	7
Occupancy Trespass (Cases) Alternatives						
1, 2, 3, 5, 7, 8	15	20	23	10	10	10
4, 6, 9	15	20	23	23	23	23
Landline Location (Miles) Alternatives						
1, 5, 8	25	20	20	20	20	20
2, 6, 7	20	20	20	20	20	20
3	30	25	25	25	25	25
4, 9	20	15	15	15	15	15
Special Use Management Rights-of-Way Grants (Cases) Alternatives						
1, 2, 3, 5, 7, 8	40	30	30	20	20	20
4	42	30	30	30	30	30
6, 9	42	30	30	20	20	20

SOILS

The effects of an alternative on the soils resource include both direct and indirect effects, depending on the activities involved. Harvesting timber results in indirect effects whereas road construction results in direct effects.

All alternatives will create some effects on the soils resource. These effects will be determined mainly through soil erosion estimates. Alternatives 1, 3, 5, 7, and 8; which emphasize market outputs; could have the greatest adverse effect on the soils resource. Management Requirements, Plan, Chapter III, mitigate any short-term impacts. Through management direction displayed in the Plan, long-term soil productivity will not be impacted by any alternative.

In all alternatives prescriptions have been identified as having the potential for improving watershed conditions. These are the timber, range, and wildlife emphasis prescriptions. Watershed improvement will occur on areas identified for range and wildlife habitat improvement and timber management. Specific projects will be undertaken primarily for watershed improvement in deteriorated watersheds. Table IV-45 displays the soils and watershed improvement scheduled on deteriorated watersheds for the planning horizon by alternative.

TABLE IV-45.

SOILS AND WATERSHED IMPROVEMENT (Acres Treated, Average Annual)

Alternative	Time Period					
	1981- 1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
1	72	76	76	60	60	60
2	150	150	50	50	50	50
3	72	76	76	60	60	60
4	100	100	40	40	40	40
5	150	150	100	100	100	100
6	100	100	40	40	40	40
7	150	50	50	50	50	50
8	150	150	100	100	100	100
9	0	0	0	0	0	0

Some management practices disturb the soil more than others. For example, road and facility construction, skid trails, and some fire suppression activities cause soil erosion to exceed tolerable limits in the immediate area of disturbance. This is a short-term effect until the loss stabilizes. The greatest unavoidable soil productivity loss will occur as a result of road construction. Proper road location, design, construction, revegetation of cutbanks, and installation of culverts will mitigate the on-site and off-site impacts. Forest sites tend to heal or revegetate naturally. This, in conjunction with mitigation, will minimize soil loss.

Fencing and water development can adversely affect the soils in that livestock tend to trail along fence lines, concentrating in fenced corners and near water developments. Trampling impacts soil and makes it susceptible to erosion. Care in placing fence lines and water developments in all alternatives will mitigate these problems.

Soils in riparian areas open to grazing will be susceptible to erosion and compaction in all alternatives. Site specific adverse impacts will occur. The individual allotment management plans will identify these impacts and implement mitigating measures.

Timber activities impact the soil. Harvesting and site-specific management activities including yarding, dozer piling, burning, and scarification affect the soil. Mitigation measures that reduce soil loss will be applied to disturbances under all alternatives.

Other impacts associated with timber activities include piling and burning slash, subsoil exposure, organic matter loss, leaching and microsite effects. Those acres that have dry, shallow, and infertile soils may be difficult to regenerate. This could impact vegetation productivity. Intensive site preparation, displaces litter and surface soil, may decrease soil productivity for a number of years and increase rotation length.

Soil erosion will not significantly reduce short-term or long-term productivity due to Forest Management Requirements which specify that restoration and rehabilitation begin within one year of termination of the disturbance. On-site soil erosion or sediment deposition will be detrimental locally if transported directly into a lake or stream.

Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area

Alternatives A, B and C for Fossil Ridge WSA and Cannibal Plateau FPA would not have any significant impact on the soils resource. Natural succession would be the dominant form of change.

In alternative D for the WSA and FPA, vegetation treatments could impact the soil. Impacts could include increased soil erosion and loss of soil productivity. The Forest Plan, Chapter III, Forest Direction mitigates any short-term impacts. Through management direction long-term soil productivity will not be impacted in alternative D.

FACILITIES

The Forest's transportation system is directly affected by management area direction. The principle effect is on the Forest's local road system and the standards selected to meet site or resource specific needs.

All alternatives propose a net increase in Forest road mileage, ranging from 3% to 23% over the planning horizon. The magnitude of the increase depends on the management intensity of renewable resources, primarily timber. The non-market emphasis of alternatives 4 and 6 provide for less road construction and

more road closures to enhance semi-primitive, non-motorized recreation opportunities and wildlife seclusion. Alternatives 1, 3, 4, and 6 provide for significant increases in trail construction and reconstruction for enhancing the quality of dispersed recreation opportunities.

In all alternatives, effects on the Forest's collector and arterial road system will predominately be reconstruction of existing system roads. Some new arterial and collector road construction will occur to access unroaded areas.

Local roads will generally be constructed by timber purchasers. There is a need in all alternatives in unroaded areas, to finance collector roads with appropriated money where current timber values are too low to carry the cost. This is especially true for first entry into a watershed drainage. All newly constructed, single-purpose local roads will be closed after resource activity completion in all alternatives.

Road construction and subsequent use can have some of the most significant impacts on the Forest. It is road use by people, rather than the actual road itself, that causes greater impacts on the environment and on other resource uses and activities. Recreation opportunities are affected by every project involving road construction, reconstruction, improvement or maintenance. Roding will displace persons seeking non-motorized recreation, but will make more area available for motorized recreation. As an example, new or improved access to a remote area might change the hiking distance to a lake from 8 miles to 1 mile, thus increasing the number of people using the lake and changing the recreation opportunities experienced. Specific project level analysis examines the Recreation Opportunity Spectrum (ROS) class and the effect or change in ROS Class that the particular project will impose as well as alternatives to mitigate or minimize recreation impacts. In addition, to retain a minimum acreage in an ROS class, e.g. semi-primitive non-motorized, annual ROS class updates of current acreages will be necessary to enable managers to ensure the objective is met. As more roads are constructed for timber access in areas not previously accessed, the occasional recreationist will be impacted in the short-term (life of a timber sale). Through the application of travel management techniques, (e.g. road closure) the long-term impacts can be minimized. Dispersed recreation management requirements as displayed in Plan, Chapter III will be followed for all alternatives. The maintenance of semi-primitive recreation opportunities in all alternatives assures that areas with minimal access will be available for hunting. As areas are roaded, opportunities for solitude and primitive and unconfined recreation will be reduced where roads are left open. The Plan, Chapter III, Management Requirements, provides direction for travel management in all alternatives. See Management Activity 'Transportation System Management' in Chapter III of the Plan.

Although the areas planned for roding will be accessed as needed, many parts of these areas will not be roaded because of natural barriers and the need to protect other resource values. Roding activities in all alternatives are generally located in areas where the respective resource values are relatively high for the types of management requiring roding.

Big game habitat effectiveness is reduced if new or improved roads are left open. The extent is determined by road density and existing vegetation cover. Elk calving areas may be disturbed and migration routes disrupted. The mitigating measure of road closures can be used in all alternatives. Additional mitigating measures will be necessary. These may include adjustment of seasons and hunter restrictions by the Colorado Division of Wildlife (DOW). Careful location of routes to avoid calving areas and migration routes is also necessary. The DOW may choose to close an area to hunting to provide the sanctuary or safe place from hunting or adjust the hunting season. Elk become highly stressed when a vehicle stops and a human being gets out of the vehicle, whereas elk have been seen grazing near highways with little apparent stress. Thus the vehicle going down a road is not as significant as human activity outside of a vehicle. As outlined in Plan, Chapter III, Transportation System Management requirements will be followed to minimize impacts on wildlife in all alternatives.

Vegetation treatment can require road construction. Roads take land out of production and impact the soil and water resources. However, Management Requirements in the Plan, Chapter III, ensure impacts are short-term in all alternatives. An environmental analysis occurs before road construction. Considerations are given to the physical and biological land characteristics as well as the goals of the management area in determining how and where to construct the road. These characteristics include slope, soil erodibility, vegetation cover, wildlife and fisheries protection, stream proximity and visual resource protection. Road use by people, rather than the actual road itself, causes greater impacts on the environment and on other resource uses and activities. Effective travel management provides resource protection and a safe, environmentally sound, and efficient transportation system. Travel management directs use of existing and future roads in all alternatives. In some areas, no roads will be built. In others, roads will be built, but their use will be restricted. In other instances, roads will be open to public use.

As an example, road construction can open up a previously unroaded area. Road use in this area can impact wildlife seclusion and semi-primitive non-motorized recreation opportunities. Travel management may restrict or close roads leading to, or in, the area based on the goals of the management areas through which the road passes. This road closure or restriction can restore wildlife seclusion, continue semi-primitive non-motorized recreation opportunities but with improved non-motorized access to the area, improve access for other resource activities, prevent unacceptable resource damage and reduce maintenance costs. Public understanding of management area and travel management goals is necessary for public acceptance of area and road closures or restrictions. Additional discussion of travel management is displayed in Chapter III under the "Facilities" section.

Road construction through riparian zones adversely affect vegetation, water quality, stream channels, and fisheries. To mitigate these impacts roads will not be constructed in riparian zones unless necessary to cross these areas. Stream crossings will be designed to avoid blockage of fish movement.

Road construction can have the most significant impacts on soil, water quality and fisheries. Proper road location, design, construction and drainage installation will mitigate the on-site and off-site impacts of road construction. Road construction or reconstruction increases sedimentation in the streams. How much is dependent on the distance to a stream, soil erodibility, erosion control measures used, etc. The more miles of road construction or reconstruction results in more sediment in the short-term and long-term. Erosion control measures, road location related to riparian zones, and the above factors relating to sedimentation will be examined on a project level basis to arrive at the appropriate mitigation measures. Increased accessibility increases fishing pressures on streams if the new or improved access is adjacent or shortens the distance by trail to a stream. The resulting increased pressure may cause a native or self-sustaining fishery to be depleted to a stage where fishing quality is lowered and stocking would become necessary to sustain a fishery. Both water quality and fishery can be protected by locating the road as far from a stream as practical. Fishery impacts may also be mitigated by Division of Wildlife regulations such as "catch and put" or "fly fishing only" to preserve or enhance fishing quality and quantity. Soil Resource Management requirements, Riparian Area Management requirements, and Wildlife and Fish Resource Management requirements as outlined in Plan, Chapter III will be followed to minimize impacts.

Roads have only a minor negative effect on timber production as land is removed from production. Roads increase the opportunity for intensive timber management practices, salvage programs, and firewood gathering in all alternatives.

Increased fugitive dust will occur with the construction of more roads. However, a dispersion of users would result in less fugitive dust by road users not being concentrated on the same roads. Fugitive dust is predominantly dependent on number of users and road surface composition (including moisture content). Thus the difference in fugitive dust from alternative to alternative is not so directly related to road mileage, but more so to concentration of traffic and also the road's proximity to other human activity. Forest Service direction is to use dust abatement when close to campgrounds, cabins, summer residences and developed recreation areas to mitigate the fugitive dust. Direction outlined in Plan, Chapter III for Air Resource Management will be followed.

Road and trail construction has the potential for disturbing or destruction of cultural resources. This potential is mitigated by cultural resource surveys prior to any ground disturbing activity as well as watching for cultural resources during actual construction. If cultural resources are discovered, they will be protected in accordance with the Cultural Resource Management requirements displayed in Plan, Chapter III for all alternatives.

The timber volume harvested by alternative will have a direct relationship to noise from logging trucks in communities along log haul routes. This noise impact will be more noticable in a community such as Cedaredge that is not on a main truck route than Delta, for instance, where log truck traffic is a very small percentage (estimated less than 1%) of the total truck traffic.

Road wildfire incidence will increase proportionately to the increased mileage of open road in combination with increased number of visitors to the Forests. If the number of visitors remains constant, the increased mileage of roads should not have an effect. Wildfire incidence could increase due to reduced ability to patrol larger areas, or more miles of roads. But the closure of newly constructed single purpose roads to vehicle use will minimize considerably the mileage of new open roads.

Road construction, reconstruction, obliteration and maintenance also affect Forest management costs. Capital investment requirements fluctuate greatly (example \$80,000 to \$800,000) depending on the feasibility of stage construction versus the need of completing a complete road length. The major capital investments (Old Grand Mesa - Hay Park and Steven's Gulch) are currently in the capital investment program. Cost Efficiency Analysis and the PNV Trade-off Analysis are also displayed in this chapter. Costs of road and trail development, maintenance and operation are included.

In summary, additional road miles result in increased expenditures for road maintenance; increased administration and law enforcement costs for road and travel management; reduced wildlife solitude; changes in recreation experiences; and land removed from productivity. Additional road miles also allow for improved hunter access; efficient access for timber management, fire control, reservoir administration and maintenance; motorized recreation; and better access for non-motorized recreation opportunities. More roads allow for a public dispersal and make a larger area of the Forest accessible for resource management and public use. Safety on the transportation system is integrated or maintained in several stages of transportation system development. Road and trail location are important to avoid rock falls or earth slides that could be a hazard. The road or trail design stage is the most significant contribution to safety. Proper road signing, maintenance and management also maintains a safe condition. Road management techniques may be used where there is a hazard due to a traffic mix. For example: a road could be restricted to logging trucks only or no logging trucks on weekends or holidays to provide user safety. Restricting logging truck traffic to weekdays would also improve the motorized recreation experience when recreation traffic volumes are highest (i.e. weekends). Another technique may simply be advising the public of road limitations (e.g. 4-wheel drive road) to ensure that the public has an understanding of a road condition or the challenges ahead. Natural hazards are managed by proper design, maintenance and signing. All phases of the transportation system (planning, design, maintenance, operation and travel management) are used to ensure safe conditions for travel in all alternatives.

The Forest and Counties coordinate their road maintenance and operation activities. Meetings are held annually to discuss and outline maintenance agreements. Road jurisdiction may be transferred to other government agencies such as counties to improve operation efficiency. Coordination with the State of Colorado Highway Department is usually done by the Regional Office and most often relates to the Forest Highway Program.

A special use permit is required for construction, reconstruction, or maintenance of roads by the public or private industry. If, for example, a company needs access for gas exploration and development, the company will be financially responsible for all construction or reconstruction costs. In the situation where a road needs improvement (e.g. single lane to double lane) for safety, the company would again be financially responsible. The rationale being the U.S. Forest Service has made the initial investment in the road and company's additional traffic causes the need for a higher standard road. Commercial users on the National Forest road system are required to provide a proportionate share of maintenance or gravel replacement.

Access for the using and resident public is generally sufficient. Some subdivisions below the Forest's boundaries, as well as lodges with Special Use Permits, desire access in the winter time which requires snow plowing. Since these needs are individual in nature, the benefiting individuals are required to provide that winter access at their own costs. Maintenance specifications relating to snow plowing are very specific to insure proper drainage, to protect the existing road surface, and to minimize loss of gravel or other surfacing materials.

Road construction is a long-term resource commitment. The magnitude of this commitment for each alternative is reflected in the total miles of road reconstruction and construction needed for management. Table IV-46 displays road construction/reconstruction and allowable sale quantity by alternative for the 50-year planning horizon.

TABLE IV-46.

ROAD CONSTRUCTION AND RECONSTRUCTION
(Miles, Total for 50-Year Planning Horizon)

Alternative	Programmed Sales Offered MMBF	Miles Constructed	Miles Reconstructed	Total Miles
1	1,844	520.3	171.2	691.5
2	1,591	493.6	166.1	659.7
3	2,238	691.5	271.0	962.5
4	778	93.7	50.0	143.7
5	1,825	536.9	168.1	705.0
6	740	93.7	50.0	143.7
7	1,582	431.7	147.8	579.5
8	1,775	367.4	136.9	504.3
9	1,117	306.7	130.7	437.2

Arterial and collector road construction or reconstruction represents approximately 32% of the total miles displayed above. The remaining mileage is local roads.

All alternatives contain areas with emphasis on range, recreation, and water. Historically these emphases have resulted in little or no road construction or reconstruction activities.

The potential transportation system requirements of oil and gas activity within the next 10 years could be significant. Oil and gas activity is in the exploration stage, but a few producing wells have been drilled. The mileage needed for oil and gas development is presently unpredictable.

Table IV-47 displays the support facilities required by each alternative.

TABLE IV-47.

SUPPORT FACILITIES REQUIRED BY ALTERNATIVE
(Total Per Period, Units As Noted)

Support Facilities	Time Period					
	1981- 1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
<u>ALTERNATIVE 1</u>						
Arterial Roads (Miles)	29.0	28.2	19.3	16.0	16.0	16.0
Collector Roads (Miles)	22.5	22.0	13.3	13.0	13.0	13.0
Local Roads (Miles)	116.1	100.0	64.0	64.0	64.0	62.1
Bridges (Each)	7	8	5	3	2	3
FA&O Buildings* (Each)	15	15	15	15	15	15
<u>ALTERNATIVE 2</u>						
Arterial Roads (Miles)	25.0	24.0	18.8	17.0	17.0	17.0
Collector Roads (Miles)	19.0	19.0	15.3	13.0	13.0	13.0
Local Roads (Miles)	95.0	90.0	68.5	65.0	65.0	65.0
Bridges (Each)	4	5	3	4	2	1
FA&O Buildings* (Each)	5	5	10	10	10	10
<u>ALTERNATIVE 3</u>						
Arterial Roads (Miles)	29.0	28.2	29.1	29.0	29.0	29.0
Collector Roads (Miles)	22.4	22.0	23.0	23.0	23.0	21.3
Local Roads (Miles)	115.8	100.0	110.0	110.0	110.0	108.7
Bridges (Each)	7.0	8.0	5.0	3.0	2.0	3.0
FA&O Buildings* (Each)	15	15	15	15	15	15

TABLE IV-47. (Cont.)

Support Facilities	Time Period					
	1981- 1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
<u>ALTERNATIVE 4</u>						
Arterial Roads (Miles)	5.7	5.6	5.5	3.0	3.0	3.0
Collector Roads (Miles)	4.5	4.4	3.0	3.0	3.0	2.3
Local Roads (Miles)	22.9	20.0	14.0	14.0	14.0	12.8
Bridges (Each)	2	3	2	3	3	2
FA&O Buildings* (Each)	5	5	10	10	10	10
<u>ALTERNATIVE 5</u>						
Arterial Roads (Miles)	29.0	28.9	15.6	15.0	15.0	15.0
Collector Roads (Miles)	23.1	22.0	15.9	13.0	13.0	13.0
Local Roads (Miles)	118.9	100.0	67.0	67.0	67.0	65.7
Bridges (Each)	7	8	4	2	2	2
FA&O Buildings* (Each)	10	10	10	10	10	10
<u>ALTERNATIVE 6</u>						
Arterial Roads (Miles)	5.7	5.6	5.5	3.0	3.0	3.0
Collector Roads (Miles)	4.5	4.4	2.8	2.8	2.8	2.9
Local Roads (Miles)	22.9	20.0	13.7	13.7	13.7	13.7
Bridges (Each)	2	3	2	3	3	2
FA&O Buildings* (Each)	10	10	10	10	10	10
<u>ALTERNATIVE 7</u>						
Arterial Roads (Miles)	24.0	22.7	15.0	15.0	15.0	12.7
Collector Roads (Miles)	18.3	18.0	11.8	11.0	11.0	11.0
Local Roads (Miles)	88.0	88.0	55.0	55.0	55.0	53.0
Bridges (Each)	6	6	4	4	1	2
FA&O Buildings* (Each)	10	10	10	10	10	10

TABLE IV-47. (Cont.)

Support Facilities	Time Period					
	1981- 1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
<u>ALTERNATIVE 8</u>						
Arterial Roads (Miles)	23.4	20.0	12.0	12.0	12.0	11.4
Collector Roads (Miles)	17.7	16.0	9.8	9.0	9.0	9.0
Local Roads (Miles)	84.0	80.0	45.0	45.0	45.0	44.0
Bridges (Each)	7	7	4	1	1	1
FA&O Buildings* (Each)	15	15	15	15	15	15
<u>ALTERNATIVE 9</u>						
Arterial Roads (Miles)	18.2	18.0	12.5	10.0	10.0	10.0
Collector Roads (Miles)	14.2	14.0	9.0	8.0	8.0	8.0
Local Roads (Miles)	76.9	60.0	40.1	40.1	40.1	40.1
Bridges (Each)	5	4	4	4	2	1
FA&O Buildings* (Each)	5	5	10	10	10	10

* FA&O = Existing Forest Service building replacement or improvement that are deficient from a structural, electrical capacity, sanitary system, or water system standpoint.

The Forest planning process has assessed the most cost-efficient road management program. Economic analysis indicates that it is more cost-efficient to close roads with gates and maintain at maintenance level 1 than to keep roads open and maintain the roads at maintenance level 2. (For a 640 acre section, the present net value of costs are \$4,960 versus \$11,890.) Keeping roads open and maintained at maintenance level 2 provides benefits related to firewood access and dispersed recreation, but would have an impact on wildlife seclusion. In addition to costs, road closures will be determined on a project level basis considering cost, the prescription and resource values for the area in all alternatives.

Where timber is the primary resource served by the access and re-entry is on a 20-year cycle, construction of temporary roads with obliteration and rehabilitation will be considered on a project level basis.

Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area

Roads will not significantly impact Fossil Ridge WSA and Cannibal Plateau FPA in alternative A, B and C. Road construction associated with mineral exploration and development will be analyzed through the environmental analysis process as operating plans are received.

In alternatives A, B and C for both Fossil Ridge WSA and Cannibal Plateau FPA, there are no scheduled vegetation treatments over the 50-year planning horizon. In alternative D for the WSA and FPA, over the 50-year planning horizon, the only vegetation treatment scheduled is timber harvest. However, no vegetation treatment in alternative D is scheduled over the next ten years.

Vegetation treatments in alternative D in both WSA and FPA will require road construction. Road construction would not maintain the wilderness characteristics of either WSA or FPA. Road construction can impact all the other resources. These impacts would be mitigated by the Forest Plan, Chapter III, Forest Direction. However, road use by people, rather than the actual road itself, causes greater impacts on the environment and on other resource uses and activities. Effective travel management provides resource protection and a safe, environmentally sound, and efficient transportation system in alternative D.

John C. Nelson and Cindy Cook commented that: "Roads in Fossil Ridge will destroy this area for outfitter and guide use, wildlife and visual quality." Roads built in the WSA would have an impact on outfitter operation, wildlife, and visual quality. Mitigation including road closures and timing of construction would reduce these impacts. There are no current proposals to build any roads in the WSA. It would be very difficult to build roads in much of the WSA due to the rough terrain.

ECONOMIC EFFECTS

ECONOMIC EFFICIENCY

Cost-efficiency analysis utilizes PNV as a criterion for assessment. PNV is discounted benefits less discounted costs, including only those outputs to which monetary values can be assigned. Refer to Appendix Table B-3 for the values used in the economic analysis.

Initially, each alternative was run in the allocation model (FORPLAN) to maximize PNV over five decades. This ensures the allocation for each alternative was comprised of the most cost-efficient set of management prescriptions. When FORPLAN had more than one option which satisfied the constraints the most economically efficient prescription would be selected. Each alternative is an economically efficient allocation, given the constraints imposed on the alternative. A discussion of constraints applied to alternatives considered in detail is presented in Appendix C and Chapter II.

To serve as a point of comparison for incremental analysis, Benchmark 1 was developed. Benchmark 1 was used to show the nondiscretionary costs necessary to provide outputs, goods and services for each alternative and other benchmarks.

Benchmark 1 represents the set of minimum unavoidable activities resulting from public land ownership. Incidental outputs included are dispersed recreation, wildlife and fish, wilderness use, and water yield. The only costs are those associated with protecting the life, health, and safety of incidental Forest users and preventing impairment of the land productivity. This ensures the economic parameters used in the alternative analysis are incremental and are in addition to variable benefits and costs. Chapter II and Appendix C display detailed information regarding benchmark analysis.

The increase in present net value between the Draft and Final EIS is attributed to two factors. The revised Region 2 benefit value for range \$10.48 per AUM was substituted for the receipt value \$1.97 per AUM used in the Draft. Although the receipt value was used in the MTVEST analysis for the Draft, the specified Region 2 benefit value was used to value range in FORPLAN. The result is an increase in the discounted benefits for range.

The second factor affecting the increase in present net value is the projected increase in demand trends for future wilderness use. The reader is encouraged to Compare the Draft EIS, Table III-13, page III-24 with the same table in the Final EIS. The overall result of the two factors is greatly increased benefits with no increase in costs.

Timber, livestock grazing, dispersed recreation, and big game are scheduled outputs in FORPLAN. MTVEST used the FORPLAN schedules and incorporated non-FORPLAN benefits and costs to calculate PNV. A discussion of the economic tables presented in this section follows:

--Table IV-48 displays non-discounted benefits and costs by decade by alternative. This includes non-Forest Service costs that would be incurred under each alternative to realize the benefits associated with Forest outputs. These estimates include non-agency expenditures by range permittees, county road maintenance, and cooperative wildlife programs.

--The cost-efficiency of each alternative is summarized in Tables IV-49 and IV-50. Benefits for excess capacity were valued at "0" dollars; positive values only contributed to outputs up to the level of projected use.

--Table IV-51 displays present net value at 4% discount rate. It summarizes discounted benefits and costs and incremental present net values and benefit-cost ratios.

An individual, M'Lynn Womble-Kenney, feels the 4% and 7 1/8% discount rates are too low. The real interest rate is the percentage increase in purchasing power. The real interest rate does not include any expected rate of inflation. In day-to-day banking transaction, the expected inflation is added to compensate for the loss in purchasing power as a result of inflation. The combined result of the real rate and the inflation rate is the nominal rate or the actual money rate. Since it would be impossible to predict the inflation rate for the 50-year planning horizon, only the real rate of 4% is used in economic efficiency analysis.

It is not possible to assign dollar values to all Forest resource outputs, the final evaluation criterion is net public benefit (NPB). Net public benefit is the overall value to the nation of all benefits less all associated costs whether or not they can be quantitatively valued. For this reason the economic parameters shown in Tables IV-48, IV-49 and IV-50 reflect only the monetary portion of the analysis used to evaluate alternatives. The best alternative is the one which maximizes NPB. Constraints used in the model ensure contributions to NPB not adequately recognized in PNV calculations are incorporated into the solution. Table IV-51 displays the PNV trade-offs resulting from the constraints. PNV trade-off analysis is also presented in Appendix E and Chapter II.

TABLE IV-48.

COST-EFFICIENCY ANALYSIS
(Non-Discounted, Million 1978 Dollars)

			Alternative								
	BM1	BM3	1	2	3	4	5	6	7	8	9
TIME PERIOD 1981-1990											
<u>Benefits*</u>											
Cash Receipts		1.086	1.048	.959	1.089	.867	1.034	.861	1.005	1.061	.893
Assigned Values Less Receipts	22.68	10.41	10.08	9.90	9.94	9.51	10.08	9.51	9.93	10.07	9.63
<u>Costs</u>											
Forest Service											
Fixed Costs											
Long-Range	.351	0	0	0	0	0	0	0	0	0	0
Planning & Inventory		.721	1.776	1.819	2.395	1.772	1.819	1.772	1.810	1.819	.925
Variable Costs											
Operational		3.627	4.410	4.129	4.728	3.508	4.631	3.497	4.519	4.440	3.361
Capital Investment		.131	.789	.398	.609	.616	.632	.385	.487	.566	.234
Non-Forest Service		.953	1.050	.953	1.050	.543	1.151	.543	1.010	1.151	.953
TIME PERIOD 1991-2000											
<u>Benefits*</u>											
Cash Receipts		1.34	1.045	.948	1.067	.872	1.023	.868	.999	1.064	.885
Assigned Values Less Receipts	24.3	12.45	12.31	12.14	12.70	11.70	12.47	11.73	12.32	12.36	11.57
<u>Costs</u>											
Forest Service											
Fixed Costs											
Long-Range	.351	0	0	0	0	0	0	0	0	0	0
Planning & Inventory		.623	1.737	1.767	1.737	1.706	1.763	1.706	1.814	1.763	.925
Variable Costs											
Operational		2.793	4.152	3.733	4.755	3.530	4.050	3.420	3.884	4.073	3.066
Capital Investment		.070	.579	.242	.627	.911	.281	.553	.226	.391	.140
Non-Forest Service		.953	1.050	.953	1.434	.543	1.151	.543	1.010	1.151	.953

TABLE IV-48. (Cont.)

			Alternative								
	BM1	BM3	1	2	3	4	5	6	7	8	9
TIME PERIOD 2001-2010											
<u>Benefits*</u>											
Cash Receipts		1.197	1.051	.950	1.109	.915	1.023	.885	1.005	1.089	.889
Assigned Values Less Receipts	25.61	14.32	14.03	13.72	13.85	13.01	14.01	13.42	13.87	13.94	13.13
<u>Costs</u>											
Forest Service											
Fixed Costs											
Long-Range	.351	0	0	0	0	0	0	0	0	0	0
Planning & Inventory		.623	1.778	1.767	1.779	1.706	1.763	1.706	1.814	1.763	.925
Variable Costs											
Operational		3.048	4.372	4.124	5.004	4.208	4.209	4.043	4.159	4.412	3.259
Capital Investment		.070	.586	.242	.739	.552	.281	.570	.226	.494	.140
Non-Forest Service		1.010	1.050	1.010	1.434	.597	1.151	.597	1.006	1.151	.953
TIME PERIOD 2011-2020											
<u>Benefits*</u>											
Cash Receipts		1.282	1.075	.940	1.113	.940	1.088	.897	1.014	1.111	.909
Assigned Values Less Receipts	25.96	17.28	17.07	16.57	17.93	15.77	16.75	16.36	16.64	17.07	15.89
<u>Costs</u>											
Forest Service											
Fixed Costs											
Long-Range	.351	0	0	0	0	0	0	0	0	0	0
Planning & Inventory		.623	1.831	1.767	1.831	1.706	1.763	1.706	1.814	1.763	.925
Variable Costs											
Operational		3.515	4.894	4.649	5.408	4.714	4.608	4.518	4.626	5.174	3.475
Capital Investment		.070	.586	.242	.827	.552	.281	.570	.226	.494	.140
Non-Forest Service		1.075	1.293	1.095	1.434	.597	1.313	.650	1.066	1.151	.953

TABLE IV-48. (Cont.)

			Alternative								
	BM1	BM3	1	2	3	4	5	6	7	8	9
TIME PERIOD 2021-2030											
<u>Benefits*</u>											
Cash Receipts		1.398	1.070	.899	1.093	.995	1.129	.908	1.000	1.081	.886
Assigned Values Less											
Receipts	25.95	20.39	20.51	19.63	21.74	18.92	19.91	19.81	19.84	20.53	19.08
<u>Costs</u>											
Forest Service											
Fixed Costs											
Long-Range	.351	0	0	0	0	0	0	0	0	0	0
Planning & Inventory		.623	1.835	1.767	1.835	1.706	1.763	1.706	1.814	1.763	.925
Variable Costs											
Operational		8.973	5.414	5.229	5.859	5.412	5.033	5.116	5.060	5.826	3.731
Capital Investment		.070	.586	.242	.901	.552	.281	.570	.226	.494	.140
Non-Forest Service		1.293	1.349	1.293	1.575	.700	1.400	.670	1.151	1.222	.953

* Cash receipt benefits are actual returns to U.S. Treasury from timber sales, grazing permits, and special use fees. RPA value benefits accrue from all outputs which were assigned monetary values. These include timber, range, deer and elk, developed recreation, and dispersed recreation. Benefit values are incremental to the minimum level benefits.

TABLE IV-49.

COST EFFICIENCY ANALYSIS SUMMARY
(Million 1978 Dollars)
4% Discount Rate

	BM1*	BM3	Alternatives								
			1	2	3	4	5	6	7	8	9
Present Value Benefits, Incremental**	203.1	312.0	302.8	294.6	313.3	290.2	302.0	286.1	298.1	304.2	283.2
Assigned Values Less Receipts	191.0	295.9	286.9	279.0	296.8	275.3	286.1	271.0	282.4	288.2	268.3
Federal Receipts	12.1	16.1	15.9	15.6	16.5	14.9	15.9	15.1	15.7	16.0	14.9
Present Value Costs, Incremental	11.4	108.4	157.0	140.5	172.4	141.8	149.4	133.8	145.5	153.2	99.4
Forest Service, Long Range											
Fixed	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Investment	0.0	6.5	9.4	8.4	10.3	8.5	9.0	8.0	8.7	9.2	6.0
Operational	0.0	75.9	110.0	98.3	120.7	99.2	104.6	93.7	101.9	107.2	69.6
General Administration	0.0	10.8	15.7	14.1	17.5	14.2	14.9	13.4	14.5	15.4	9.9
Non-Forest Service - Cooperator Costs	4.1	15.2	21.9	19.7	24.1	19.9	20.9	18.7	20.4	21.4	13.9
Present Net Value, Incremental	191.7	203.6	145.8	154.1	140.9	148.4	152.6	152.3	152.6	151.0	183.8
Benefit Cost Ratio, Incremental	17.8	2.88	1.93	2.10	1.82	2.05	2.02	2.14	2.05	1.99	2.85

* The figures for BM1, Minimum Level, are not "incremental". Figures for BM3 and the alternatives 1-9 are "incremental" to BM1.

** All demand curves are horizontal. Consumer surplus is zero and not shown.

TABLE IV-50.

COST EFFICIENCY ANALYSIS SUMMARY
(Million 1978 Dollars, 7 1/8% Discount Rate)

	BM1*	BM3	Alternatives								
			1	2	3	4	5	6	7	8	9
Present Value Benefits, Incremental**	125.3	183.4	177.6	173.3	182.6	168.6	177.7	167.2	175.2	178.4	166.6
Assigned Values, Less Receipts	118.2	174.2	168.3	164.2	173.0	159.9	168.4	158.4	166.0	169.0	157.5
Federal Receipts	7.1	9.2	9.3	9.1	9.6	8.7	9.3	8.8	9.2	9.4	8.8
Present Value Costs, Incremental	7.4	65.9	99.1	88.2	108.3	88.0	95.3	82.4	92.3	95.8	62.9
Forest Service - Long Range											
Fixed	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Investment	0.0	4.0	5.9	5.3	6.5	5.3	5.7	4.9	5.5	5.7	3.8
Operational	0.0	46.2	69.4	61.8	75.8	61.8	66.7	57.7	64.6	67.1	44.0
General Administration	0.0	6.5	9.9	8.8	10.8	8.8	9.6	8.3	9.3	9.6	6.3
Non-Forest Service - Cooperator Costs	2.7	9.2	13.9	12.3	15.2	12.1	13.3	11.5	12.9	13.4	8.8
Present Net Value, Incremental	117.9	117.5	78.5	85.1	74.3	80.6	82.4	84.8	82.9	82.6	103.7
Benefit Cost Ratio, Incremental	16.93	2.78	1.79	1.96	1.69	1.92	1.86	2.03	1.90	1.86	2.65

* The Figures for BM1, Minimum Level, are not "incremental". Figures for BM3 and the Alternatives 1-9 are "incremental" to BM1.

** All demand curves are horizontal. Consumer surplus is zero and not shown.

TABLE IV-51.

PRESENT NET VALUE TRADE-OFF ANALYSIS
(Summary All Decades, Million 1978 Dollars)
4% Discount Rate

	Alternatives										
	BM2*	BM3*	Highest PNV					Lowest PNV			
			9	2	7	5	6	8	4	1	3
Discounted Costs (PVC)	137.4	108.4	99.4	140.5	145.5	149.4	133.8	153.2	141.8	157.0	172.4
Discounted Benefits (PVB)	311.3	311.9	283.2	294.6	298.1	302.0	286.1	304.2	290.2	302.8	313.3
Present Net Value, Incremental (PNV)	173.9	203.6	183.8	154.1	152.6	152.6	152.3	151.0	148.4	145.8	140.9
difference in PNV (from BM3)			-19.8	-49.5	-51.0	-51.1	-51.3	-52.6	-55.2	-57.8	-62.7
difference in PVC (from BM3)			- 9.0	+32.1	+37.1	+41.0	+25.4	+44.8	+33.4	+48.6	+64.0
difference in PVB (from BM3)			-28.7	-17.3	-13.8	- 9.9	-25.8	- 7.7	-21.7	- 9.1	+ 1.4
Contributions made to Total											
Discounted Benefits by Resources											
Timber		17.9	11.9	15.2	15.2	18.8	6.7	19.0	6.8	18.9	22.0
Range		91.2	71.9	74.7	77.9	77.9	71.2	75.7	71.3	75.6	76.5
Recreation											
Developed		46.1	43.2	46.1	46.1	46.2	52.0	50.8	55.6	49.3	55.4
Dispersed		30.7	30.0	30.8	30.8	30.8	31.0	30.1	30.3	29.9	30.8
Winter Sports		44.8	44.8	44.8	44.8	44.8	44.8	44.8	44.8	44.8	44.8
Wilderness		26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1
Wildlife		54.7	52.1	53.2	53.5	53.5	51.1	53.2	51.9	54.3	53.8
Water		.4	3.2	3.7	3.7	3.9	3.3	4.5	3.4	3.9	3.9

*BM2 = Benchmark 2

BM3 = Benchmark 3

Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area

An economic efficiency analysis was conducted for the Fossil Ridge Wilderness Study Area and Cannibal Plateau Further Planning Area. Each area was evaluated for its suitability or unsuitability for wilderness designation. This analysis was based on dollar benefits associated with timber, water yield, recreation, and range. Dollar benefits for resource outputs were the same as those used previously in the benchmarks and alternatives. Annual benefits and costs were estimated over the first five decades and discounted to the present using discount rates of 4 percent and 7 1/8 percent. This analysis is presented in Appendix I.

BUDGET ESTIMATES

The budget requirement for each alternative is necessary to produce the goods and services and implement management requirements, including laws and regulations for all resources and uses. Table IV-52 displays the estimated average annual budget necessary to implement each alternative. For comparison purposes, the budget expenditures for fiscal year 1981 are also shown. All values are in 1978 dollars. All alternatives schedule an increase in funding over current level, except Alternative 9, which schedules a 25% reduction.

TABLE IV-52.

EXPENDITURES AND RETURNS
(Summary All Decades, Thousand 1978 Dollars,
Average Annual)

Alternative	Budget Expenditures	Returns to the U.S. Treasury
Current Year	6,314.6	879.1
1	7,665.6	1,057.7
2	6,990.8	939.1
3	8,415.8	1,094.4
4	7,144.8	916.6
5	7,229.6	1,059.6
6	6,830.3	883.6
7	7,104.2	1,004.7
8	7,639.0	1,081.4
9	4,970.8	892.3

Alternative 5 was formulated to maximize market output opportunities and Alternative 3 to meet 1980 RPA targets displayed in the Regional Guide. Both have high market outputs and associated high costs. Alternative 1, the Proposed Action, has higher costs than Alternative 5 even though timber and range outputs are lower. This is the result of trail construction/reconstruction emphasis and an objective to construct developed recreation sites to meet half of increased demand after 1990.

Alternative 2 is the no action alternative. Alternatives 4 and 6 also have lower costs than many other alternatives. They produce less timber and range outputs. This is offset by the investment needed to emphasize recreation and wilderness management.

Alternative 9 was developed as a constrained budget alternative, with a 25% reduction from fiscal year 1982 budget levels.

Capital investment includes reforestation, roads, trails, developed recreation sites, bridges, trailheads, and building construction and reconstruction. There is a direct relationship between the market output levels of an alternative and the capital expenditures. However, Alternative 4 has a low emphasis on market products with the highest expenditure for capital investment. This is due to the high level of trail construction and reconstruction that is scheduled.

EMPLOYMENT, POPULATION, AND INCOME

Each alternative would have a unique effect upon employment, population, and total income patterns within the economic impact areas. Differences are mostly determined by the output levels that would be produced under each alternative.

The direct, indirect, and induced effects on population, employment, income, and payments to counties are displayed in Table IV-53.

TABLE IV-53.

ECONOMIC IMPACT ANALYSIS
(EIA-214 and EIA-215)

		Base Year 1977	Change From Base Year By Alternative								
Unit*			1	2	3	4	5	6	7	8	9
FIRST DECADE (1981-1990)											
Population											
EIA-214	M Persons	113.0	3.02	2.34	3.18	2.43	3.04	2.43	2.90	3.02	2.67
EIA-215	M Persons	9.3	2.41	2.38	2.41	2.37	2.41	2.37	2.40	2.41	2.37
Income											
EIA-214											
Employee											
Compensation	MM\$	363.1	4.3	3.9	4.7	3.0	4.3	3.0	4.0	4.3	3.5
Property Income	MM\$	252.0	2.3	2.0	2.5	1.3	2.4	1.3	2.2	2.3	1.6
Total Income	MM\$	615.1	6.6	5.9	7.2	4.3	6.7	4.3	6.2	6.6	5.1
EIA-215											
Employee											
Compensation	MM\$	28.6	3.2	3.2	3.2	3.1	3.2	3.1	3.2	3.2	3.1
Property Income	MM\$	21.0	2.0	2.0	2.0	1.9	2.0	1.9	2.0	2.0	2.0
Total Income	MM\$	49.6	5.2	5.2	5.2	5.0	5.2	5.0	5.2	5.2	5.1
Employment											
EIA-214											
Agriculture	M Jobs	1.424	.016	.013	.019	.004	.018	.004	.015	.016	.007
Mining	M Jobs	2.901	.003	.003	.003	.002	.003	.002	.003	.003	.002
Manufacturing	M Jobs	4.111	.049	.049	.050	.047	.050	.047	.049	.049	.048
Lumber/Wood											
Products	M Jobs	2.220	.056	.027	.079	-.003	.054	-.033	.035	.056	.002
Transportation	M Jobs	2.450	.011	.010	.012	.008	.011	.008	.011	.011	.009
Wholesale/Retail	M Jobs	8.662	.116	.113	.118	.111	.117	.111	.115	.116	.113
Services	M Jobs	9.079	.345	.343	.347	.338	.346	.338	.344	.345	.341
Total		30.85	.596	.558	.629	.477	.599	.477	.572	.596	.522
EIA-215											
Agriculture	M Jobs	.056	.012	.012	.013	.011	.013	.011	.013	.012	.011
Mining	M Jobs	.479	.002	.002	.002	.001	.002	.001	.002	.002	.001
Manufacturing	M Jobs	.075	.030	.030	.030	.030	.030	.030	.030	.030	.030
Lumber/Wood											
Products	M Jobs	.105	.004	.003	.005	-.001	.003	-.001	.003	.004	.001
Transportation	M Jobs	.076	.009	.009	.009	.009	.009	.009	.009	.009	.009
Wholesale/Retail	M Jobs	.659	.109	.109	.109	.108	.109	.108	.109	.109	.108
Services	M Jobs	.965	.322	.321	.322	.321	.322	.321	.322	.322	.321
Total		2.415	.488	.486	.490	.479	.488	.479	.488	.488	.481
Workforce Unemployment Rate											
EIA-214	%	4.8	4.7	4.4	4.8	4.8	4.8	4.8	4.8	4.7	4.8
EIA-215	%	3.9	2.0	2.4	2.0	2.4	2.0	2.4	2.0	2.0	2.4
Payments to Counties**											
Delta	M \$	14.6	19.3	16.6	20.5	14.3	19.1	14.3	18.2	19.5	15.5
Garfield		2.4	3.2	2.8	3.4	2.4	3.2	2.4	3.0	3.3	2.6
Gunnison		97.4	128.4	110.9	136.8	95.3	127.3	95.3	121.0	130.0	103.0
Hinsdale		14.6	19.3	16.6	20.5	14.3	19.1	14.3	18.2	19.5	15.5
Mesa		36.5	48.2	41.6	51.3	35.7	47.7	35.7	45.4	48.8	38.6
Montrose		24.3	32.6	27.7	34.2	23.8	31.8	23.8	30.3	32.5	25.8
Ouray		9.7	12.8	11.1	13.7	9.5	12.7	9.5	12.1	13.0	10.3
Saguache		26.8	35.3	30.5	37.6	26.2	35.0	26.2	33.3	35.8	28.3
San Juan		2.4	3.2	2.8	3.4	2.4	3.2	2.4	3.0	3.3	2.6
San Miguel		14.6	19.3	16.6	20.5	14.3	19.1	14.3	18.2	19.5	15.5

* EIA = Economic Impact Area

M Persons = Thousand Persons

MM\$ = Million Dollars

** Estimated Total Payments to Counties

% = Percentage

M\$ = Thousand Dollars

M Jobs = Thousand Jobs

RETURNS TO THE U.S. TREASURY

Total returns to the U.S. Treasury were calculated for each alternative from the returns for each revenue-producing activity on the Forest. Estimates were made of the revenues that would be produced at the midpoint of each of the planning periods. Estimates are displayed in Table IV-52.

PAYMENTS TO COUNTIES

Each year, 25% of the value of receipts from National Forest outputs goes to the State for distribution to the counties where the particular National Forest is located. A discussion of the "25 Fund" is presented in Chapter III. Projected payments to counties from the "25 Fund" by alternative are displayed in Table IV-53.

In addition to these payments, additional payments in lieu of taxes are authorized for some counties where other payments are less than 75 cents per acre. This program is dependent on annual Congressional appropriations and is administered by the USDI, BLM.

SOCIAL EFFECTS

Some significant social changes will take place in the ten-county planning area regardless of alternative. These changes are due to energy and minerals development.

The general lifestyle within SRU H is rural. Approximately half of the population lives within twenty miles of Grand Junction. This area is developing as the energy center of the west slope.

Attitudes, beliefs, and values range from no-growth to desires for continued economic expansion. These attitudes will apply to specific resource management issues regardless of the alternative implemented and the management strategies applied.

The SRU is one of the most rapidly growing areas in Colorado. Most of this growth can be attributed to factors other than National Forest System land management.

Increasing population is likely to cause additional subdivision effects on the Forest. These effects include access and big game winter range loss.

The Forest has two destination ski areas, Crested Butte and Telluride and one day-use ski area, Powderhorn. Monarch ski area, located on the Pike and San Isabel National Forest, has potential for expansion onto the Forest. The two destination ski areas are orientated to tourism. The alternatives which increase or decrease grazing and logging would have minor effects on the overall economy of these areas. All alternatives allow existing ski areas to expand.

The amount of Forest timber offered annually in Alternatives 1, 2, 3, 5, 7, and 8 will provide access and firewood volumes sufficient to meet demand. Alternatives 4, 6, and 9 will not provide access and fuelwood volumes sufficient to meet demand. Firewood shortages will occur in Alternatives 4, 6, and 9.

Rapidly increasing populations can impact a community by overloading support services such as law enforcement and medical facilities.

Both Crested Butte and Telluride are currently accommodating rapid growth attributed to ski areas.

Alternatives are based on different management emphases. These different emphases produce different output levels, and generate various social effects. The output levels of all alternatives fall within a range determined by resource capabilities, National and Regional needs, and legal constraints. The overall social effects of any alternative will often be subtle and difficult to discern.

The goods and services that result from the various alternatives will have varying effects within the HRU's. This is due to the degree of dependency of that HRU on the Forest. Timber, fuelwood, range, and recreation outputs, will have the most significant effects.

Alternatives 1, 2, 3, 5, 7, and 8 will increase permitted livestock over present levels; and alternatives 4, 6, and 9 would decrease grazing levels. The magnitude of the effect would be dependent on the health of the livestock industry and the availability of alternate forage sources.

The recreation industry is expected to grow over the next decades, with National Forest use contributing to that growth. Recreation use will increase under all alternatives, but the mix of recreation types will vary. Alternatives 2, 5, 7, and 9 provide no additional developed recreation facilities to meet increasing demand. Alternatives 1, 6, and 8 meet 50% of increased demand over current capacity; and alternatives 3 and 4 meet all of the anticipated increased demand. Alternatives 4 and 6 place greatest emphasis on dispersed non-motorized recreation opportunities.

Growth related to alternatives 1, 3, 5, 7, and 8 is not great enough to cause problems with providing social services required in any HRU's. The growth associated with alternatives 4, 6, and 9 would have fewer impacts. Increasing population associated with the alternatives is too small to have a significant land use effect off the Forest.

In Cannibal Plateau FPA and Fossil Ridge WSA, no significant social changes will take place in any alternatives.

SOCIAL EFFECTS OF ALTERNATIVES BY HUMAN RESOURCE UNIT

Collbran Human Resource Unit

The general lifestyle within the Collbran HRU is rural. The livestock industry, and to a lesser extent the recreation industry is dependent on the Forest. These would be most affected by implementation. Public issues indicate the predominant attitude in the HRU is against wilderness designation and against further large scale roading. The public wishes to maintain the quality and quantity of the rural livestock industry. Alternatives 4 and 6 provide the most dispersed recreation opportunities, and recommend no additional wilderness near the HRU. These alternatives have a negative impact on the rural livestock industry due to scheduled decreases in permitted livestock numbers. The area is also increasingly impacted by energy development, in particular oil and gas drilling. Access needs conflict with the public's desire to limit road access in the HRU.

Crested Butte Human Resource Unit

The Crested Butte HRU is oriented toward tourism, with a lesser dependence on the logging and livestock industry than other parts of Gunnison County. Alternatives which increase or decrease grazing and logging would have minor effects on the overall economy. All alternatives allow Crested Butte ski area expansion onto Snodgrass Mountain which is within the existing permit area.

The predominant attitudes of the Crested Butte HRU favor wilderness preservation and dispersed recreation opportunities.

Grand Junction Human Resource Unit

The lifestyle within the Grand Junction HRU is largely urban. The recreation industry, and to a less extent the livestock industry, is dependent on the Forest. They would be affected by alternative implementation. A large segment of the urban population is dependent to some extent on obtaining fuelwood for their homes. The area is also dependent on the Forest for its municipal water supplies.

The Grand Junction area is growing rapidly due to its emergence as an energy development center. This increasing population will demand more recreation opportunities in the Grand Mesa and Uncompahgre Plateau areas.

Gunnison Human Resource Unit

This HRU is probably affected more by Forest land management than the other HRU's. The recreation, logging, and livestock industries are largely dependent on the Forest. Minerals extraction from the area could have increasingly major impacts (such as the proposed Mt. Emmons Mining Project). Decisions regarding recreation opportunities and resource development will have a significant impact in the HRU due to its dependence on the tourist industry.

North Fork Human Resource Unit

The lifestyle within the North Fork HRU is rural. The livestock, logging, and recreation industries are dependent on the Forest. They would be affected by

alternative implementation. The area is increasingly impacted by energy development, in particular oil and gas drilling and coal mining. Access needs conflict with the public's desire to limit road access in the HRU.

One of the major agricultural activities in the North Fork HRU is fruit growing. In heavy snow years, big game often damage local orchards. For the North Fork HRU, Forest wildlife habitat improvement could decrease big game damage on private land.

Uncompahgre Human Resource Unit

The lifestyle within the Uncompahgre HRU is a diverse mix. The area would not be greatly changed by alternative implementation. The livestock, logging, and recreation industries are dependent to a small degree on the Forest, when compared to other HRU's. A major recreation related impact on lifestyles might occur from the planned expansion at Telluride. This is expected to occur under all alternatives. The expansion will create additional growth and urbanization that could affect the rural lifestyle prized by many HRU residents.

EFFECTS ON MINORITIES AND WOMEN

Effects on minorities and women will result from two areas: internal Forest Service programs in which members of minority groups and women are hired directly by the agency, and external opportunities in which members of minority groups and women could obtain Forest Service contracts and permits. Employment falls under the Equal Employment Opportunity (EEO) Program.

Additional effects on women and minorities could be realized through Forest contracts. Currently, approximately ten percent of the dollar value of all contracts are set-aside as "8A" contracts, reserved by the Small Business Administration to develop minority and women contractors. These involve such activities as thinning, tree planting, fence building, and road construction. As the level of these activities varies by alternative, the total dollar value of "8A" contracts also varies. Since most work placed under contract by the Forest relates to market production (e.g. timber and livestock grazing), there is a direct relationship between these outputs and the opportunities available. Alternatives 3, 5, and 7 with high emphasis on such outputs, provide the greatest opportunity for women and minority contracts. Alternatives 4 and 6, with low emphasis on such outputs, would provide the least. Other alternatives would have effects between the extremes.

POSSIBLE CONFLICTS

RESOURCE PLANNING ACT (RPA) PROGRAM OBJECTIVES

Outputs for each alternative were compared with the outputs and activities assigned to the Forest by RPA through the Regional Guide. Table IV-54 displays these targets. The year 1995 was used to display implementation of the early years of the Regional Guide. A similar review was made to compare the projected total 50-year outputs between RPA and the alternatives. Alternative 3 is the RPA Alternative.

TABLE IV-54.

REGIONAL GUIDE ASSIGNED OUTPUTS AND ACTIVITIES*
(Grand Mesa, Uncompahgre, and Gunnison National Forests)

Output/Activity	Unit Of Measure	Time Period									
		1981**	1982**	1983**	1984**	1985**	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
RECREATION											
Developed Rec. Use (Inc. VIS)	MMRVD	.80	.90	1.20	1.20	1.20	1.20	1.50	1.90	2.10	2.50
Dispersed Rec. Use (Inc. Wild. and Fish)	MMRVD	1.40	1.00	1.10	1.50	1.60	1.70	1.70	2.20	2.30	2.30
Trail Const./Reconstruction	Miles	20.0	6.0	8.0	10.6	11.0	11.0	24.0	41.0	60.0	76.0
WILDERNESS											
Wilderness Mgmt	Acres	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FISH & WILDLIFE											
Wildlife Hab. Improvement	M Acres	76	61	46	69	77	82	67	51	32	32
RANGE											
Grazing Use (Livestock)	MAUM	334	335	335	335	335	335	335	335	340	340
TIMBER											
Programmed Sales Offered	MMBF	28.0	28.0	32.0	39.0	39.0	42.0	44.0	45.0	45.0	45.0
Reforestation	Acres	2593	2300	1041	900	800	1000	1000	1000	1000	1000
Timber Stand Improvement	M Acres	1.36	1.80	2.43	.50	.70	.30	.20	.50	.50	.70
WATER											
Meeting Water Quality Goals	MM Acre Feet	2.20	2.10	2.10	2.20	2.20	2.40	2.50	2.55	2.55	2.55
MINERALS											
Minerals Leases And Permits	Operating Plans	147	100	100	105	108	118	136	156	182	184
HUMAN & COMMUNITY DEVELOP.											
Human Resource Programs **	Enrollee Years	14	30	30	30	30	NA	NA	NA	NA	NA
PROTECTION											
Fire Mgt. Effectiveness Index	Dollars/Thousand Acres	146	146	146	261	260	254	254	254	252	251
Fuelbreaks and Fuel Treatment	M Acres	1.3	2.1	2.1	2.1	2.2	1.8	2.0	1.6	1.6	1.6
LANDS											
Land Purchase & Acquisition Excl. Exchange	MAcres	.760	1.000	1.000	1.000	1.255	0.365	NA	NA	NA	NA

TABLE IV-54. (Cont.)

Output/Activity	Unit Of Measure	Time Period									
		1981**	1982**	1983**	1984**	1985**	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
SOILS											
Soil & Water Res. Improvement (Imp. Watershed Condition)	M Acres	.063	.076	.076	.076	.076	.076	.076	.060	.060	.060
FACILITIES											
Road Con./Recon. (Arterial, Collector)	Miles	--	11.0	14.2	5.8	6.6	13.0	8.6	7.3	4.8	2.5
BENEFITS											
Returns to U.S. Treasury	MM Dollars**	.7	.7	1.4	2.4	2.5	2.6	2.6	2.7	2.7	2.8
COSTS											
Elements	MM Dollars	9.4	8.9	7.5	2.9	3.1	5.4	6.6	6.8	6.6	6.5
Capital Investments**	MM Dollars	.9	1.5	2.5	5.6	6.3	4.9	6.0	6.5	7.5	8.0
Backlog Total	MM Dollars	1.2	1.1								
Appropriated**	MM Dollars	9.2	8.7	7.4	8.5	9.4	10.3	12.6	13.3	14.1	14.5
Allocated Funds**	MM Dollars	2	.2	1	1.1	1.1	.6	NA	NA	NA	NA
Total NFS	MM Dollars	9.4	8.9	7.5	9.0	10.5	10.9	12.6	13.3	14.1	14.5

** Human Resource Programs are not included in figures beyond 1985.

All costs and returns are shown in constant 1978 dollars.

Capital investment includes timber stand improvement, reforestation, arterial, collector, and local roads, and trails.

NFS Appropriated Funds include all YCC and Cooperator Funds.

NFS Allocated Costs include YACC and other human resource programs, O&C grants, land and water conservations, and other funds. Costs exclude payments to State and counties and Federal highway funds.

Wildlife and Fish - For the 1981 time period only the unit of measure is acre equivalents.

1981-1983 data source is program budget proposals, except for (1) reforestation which is from a schedule developed by TM 10.80; (2) fire management effectiveness index which is from A&FM; (3) capital investments which include only those items used in 1984 to 2030 period, in order to provide comparable data; (4) backlog dollars are for the backlog portion of reforestation using regional average cost for acres shown.

Data for 1984 onward is planning data from REGPLANS or appropriate staff.

Source: * Final Rocky Mountain Regional Guide, June 1983.

Recreation

The RPA program objective for developed recreation (including downhill skiing) is 1,500,000 recreation visitor days (RVD's). No alternative will meet this objective. The estimated demand for developed recreation in 1995 is 1,314,000 RVD's. The program objective exceeds demand. All alternatives will meet the demand for downhill skiing. Alternative 3 (RPA) and 4 meet 100% of demand for National Forest System developed recreation. Alternative 1, 6, and 8 meet 50% of the increased demand above existing capacity for developed recreation after 1990.

The RPA program objective for dispersed recreation is 1,700,000 RVD's. Demand for dispersed recreation is expected to be 1,963,000 RVD's. All alternatives will meet demand. All alternatives exceed the program objective.

The RPA program objective for trail construction/reconstruction is 24 miles per year. A minimum of 50 miles per year is necessary to maintain the trail system consistent with Regional direction. The RPA target will not permit trail system management adequate to achieve Regional direction. Alternatives 1, 4, and 6 exceed the RPA objective and meet or exceed Regional direction.

Fish and Wildlife

All alternatives are above the RPA objectives. This is primarily due to higher vegetation management activities in other resources that improve wildlife habitat.

Range

The RPA program objective for permitted grazing use is 335,000 AUM's. Alternatives 4 and 6 emphasize non-market outputs. These alternatives schedule grazing outputs at 309,900 AUM's and do not meet the RPA program objective. Alternative 9, the reduced budget alternative, also does not meet the objective. Alternatives 1 and 2 are approximately equal to the RPA target. Alternatives 3 (RPA), 5, 7, and 8 exceed the target by 1% to 5%.

Timber

The RPA program objective for reforestation is 1,000 acres. All alternatives schedule less reforestation than the target. Current silvicultural methods are obtaining successful natural regeneration and consequently there is not a need under any alternative for this much reforestation.

The RPA target for timber stand improvement is 200 acres. All alternatives exceed this target. Based upon the volume of timber harvested and the acres treated the RPA target is too low.

The RPA target for programmed sales offered is 44 MMBF. This output was defined as the maximum acceptable to the Forest management team, and included in Alternative 3. Eight alternatives schedule less than the target.

Three hundred fifty million board feet of timber will be offered for sale during the period 1984 through 1993 in the Proposed Action. To respond to local interest in accelerating the timber harvest schedule, 35 MMBF will be

offered in 1984, and 55 MMBF will be offered annually in 1985 through 1987. A review of the local demand situation will be made prior to the end of 1987 to determine if local demand for timber has significantly changed. If local demand for timber changes significantly, the Plan will be reanalyzed as required by NFMA Regulation 36 CFR 219.10(c). If local demand has not significantly changed, the remainder of the 350 MMBF planned for the decade will be offered in 1988 through 1993 at a rate of 25 MMBF annually. Any of the volume offered but not sold in the first 4 years will still be available for reoffer.

Water

All alternatives will meet the RPA target for water quality goals, since the original estimate for the current condition appears to have been low. Increased water yield through vegetation treatment will also be a factor in meeting the goal.

Minerals

All alternatives except Alternative 9, will meet the RPA target for mineral leases and permits.

Protection

All alternatives except Alternative 9, the reduced budget alternative, will meet the RPA target for fuel treatment.

Soils

Alternatives 1, 3 (RPA), 5, and 8 will meet the RPA target for soil and water resource improvement.

Facilities

No alternative reflects the need for as high a level of arterial and collector road construction/reconstruction as shown in the RPA objective. The arterial/collector road system, in terms of miles, is approximately 90% in place. Most of the future construction/reconstruction will be local roads.

Returns to the U.S. Treasury

No alternative including Alternative 3 (the RPA Alternative) meets the RPA target.

Total National Forest System Costs

No alternative projects costs to be as high as the RPA cost estimate.

OBJECTIVES OF OTHER FEDERAL, STATE, COUNTY, AND LOCAL GOVERNMENTS

Early in the Forest planning process, other Federal, State, and local Governments were asked to document their objectives and show how National Forest System management might affect them. This effort included scoping meetings, letters, news releases, and implementing the State Clearing House procedures. Other government agencies completed worksheets identifying their agency goals and objectives.

Review of plans and written and verbal comments did not identify any major conflicts. The review did surface the following opportunity or areas needing specific attention:

- The habitat requirements for increased numbers of deer and elk on the Forest discussed by the Colorado State-Wide Comprehensive Plan for National Forests will not be fully met in Alternatives 4, 6, or 9.
- The 1981 Colorado Outdoor Recreation Plan recommends that the Forest provide additional opportunities for picnicking, four-wheeling and downhill skiing. All of the alternatives would meet projected demand for these activities through the year 2030.
- A potential conflict exists between the Forest and BLM regarding oil and gas leases. The Forest's analysis did not consider restricted access through contiguous land owners.
- Local counties have long used live streams as a source of gravel. Forest management requirements for riparian areas may curtail this traditional use.

ENERGY REQUIREMENTS

Energy is consumed in the administration and use of natural resources from the Forest. For the purpose of this analysis energy sources are: gasoline, diesel fuel, liquified petroleum, natural gas, electricity, and wood. The main activities which consume energy are timber harvest, range use, recreation (both dispersed and developed), road construction or reconstruction, and administrative activities of the Forest.

Energy consumed in timber harvesting is the estimated amount required for felling, bucking, skidding, loading, hauling, performing road maintenance commensurate with the volume hauled, and the industrial traffic associated with the logging activities.

Energy consumed in utilizing range vegetation is the estimated amount required for hauling cattle to and from the range, permittee range improvement activities, watering, salting, and herding.

Recreation related energy consumption is based on the estimated number of dispersed and developed recreation visitor days and estimated trip lengths.

Energy consumed in road construction and reconstruction activities is that used by timber purchasers or contractors in completing road development work.